TRENDS AND DEVELOPMENTS

Fishing Vessel and Gear Developments

EQUIPMENT NOTE NO. 15--AIRLIFT FOR HARVESTING OYSTERS:

A new machine for harvesting oysters has been developed by the Olympia Oyster Company, Shelton, Wash. This oyster harvester uses high-pressure water jets to loosen the oysters from the sea bed and an airlift pump to bring the oysters to the surface. A patent is pending on this machine (components of the new harvester are shown in figs. 1 and 2).

Fig. 1 - The airlift oyster harvester tied to the dock.

recovers almost all oysters in its path, even on dense beds, and can harvest up to 100 bushels in 10 minutes. David McMillan, manager of the Olympia Oyster Company, designed the harvester to operate in calm waters at depths of 8 to 16 feet. Two men are required to operate the machine.

In addition to bringing large oysters to the surface, the harvester collects and transfers immature oysters from growing beds to fattening beds. The designer believes the harvester improves the condition of the oyster beds by removing silt, and could be easily adapted for harvesting clams.

The high-pressure jet-airlift system takes effect after the forward movement of the harvester has forced oysters into the mouth of the airlift duct. Air, which is pumped into the bottom of the duct, rises and forces water and oysters up the duct and onto the conveyor. The oysters are conveyed onto a barge. The depth of the mouth of the airlift duct is controlled by hollow floats into which water or air is pump-

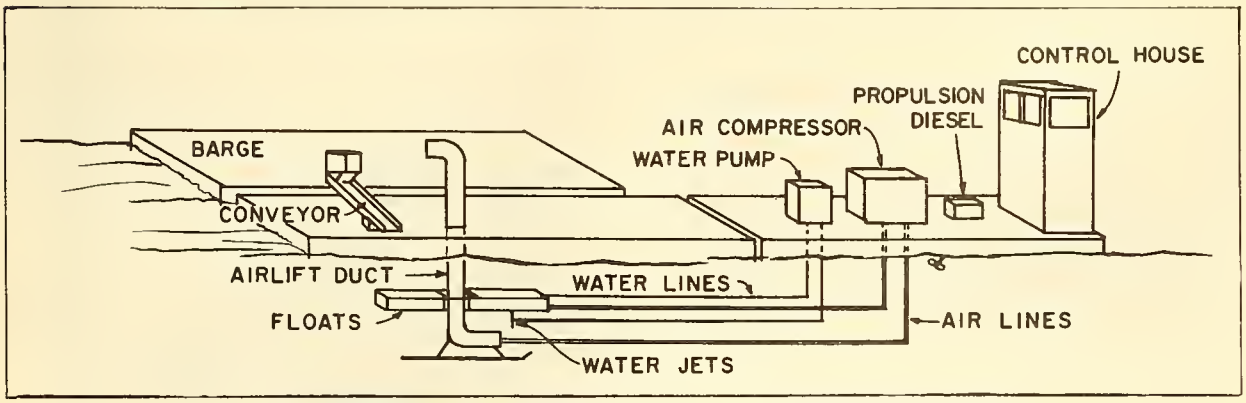

Fig. 2 - A schematic diagram of the airlift oyster harvester showing all the major components.

Depending on bottom conditions, this machine efficiently harvests oysters from a 3-foot-wide swath at speeds ranging from $\frac{1}{2}$ to 3 miles an hour. The harvester reportedly

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ed. The outer shell of the duct slides like a telescope to adjust for varying water depth.

The high-pressure water jets are not always needed and are used only on beds that have heavy oyster concentrations or are heavily silted. A propulsion Diesel engine with an outboard attachment moves the harvester over the oyster beds. Controls mounted in the control house provide for steering the harvester and include devices for adjusting the depth of the mouth of the airlift duct and the quantity of air flowing into the airlift duct.

--By Leonard J. Johnson, Mechanical Engineer, Exploratory Fishing and Gear Research Base, U.S. Bureau of Commercial Fisheries, Seattle, Wash.

Alaska

FOREIGN FISHING ACTIVITY OFF ALASKA, OCTOBER 1964:

U. S. S. R.: The Soviets maintained a trawling fleet in the Gulf of Alaska throughout October, although its size continued to diminish. By the end of October it was estimated the fleet numbered less than 20 vessels consisting of about 10 to 12 trawlers, 4 reefers, and a few support vessels. During the month the fleet again concentrated on the Continental Shelf edge about 40 miles southwest of Yakutat Bay, an area the Soviets fished heavily in the spring of 1964. Intermittent observations from surface and aerial patrol units indicated they were making excellent catches of Pacific ocean perch.

Fig. 1 - Soviet trawler under way in Bering Sea with all nets aboard.

There were indications that the Soviets had resumed their shrimp fishery in the eastern Bering Sea, presumably in the vicinity of the Pribilof Islands. In late September two trawlers were reportedly dispatched to resume that fishery, which was started early in the spring of 1964 but came to an end by early June.

There were no sightings of Soviet whaling vessels in the Alaskan area and it was believed their whaling efforts in the North Pacific were over for the year.

Japan: Withdrawal of nearly all Japanese fisheries off Alaska was to be completed by the end of October. The vessel Chichibu Maru, accompanied by 12 trawlers, was licensed by the Japanese to fish throughout the year, primarily for shrimp. Last reports were that the fleet was still operating generally north of the Pribilof Islands, and was expected to continue fishing for shrimp until the end of 1964.

The factory trawler Daishin Maru No. 15 terminated her "exploratory" operations in the Gulf of Alaska and sailed for Japan about

Fig. 2 - Japanese king crab factoryship Tokei Maru. Most of the production consists of canned king crab meat.

Fig. 3 - Small runner boat attached to Tokei Maru.

the middle of October. Of the other 5 trawlers similarly licensed for the Gulf, only the factory trawler Taiyo Maru No. 77 was seen during the month. She was fishing near Portlock Bank east of Kodiak at the time. Licenses issued the 6 "exploratory" vessels for Gulf of Alaska operations reportedly expired October 31, 1964, and they were presumed to have terminated their fishing in the Gulf.

The Tokei Maru and Tainichi Maru king crab fleets, which have consistently fished in the area north of Port Moller, reportedly filled their catch quotas totaling 235,000 cases and left for Japan by late September.

Fig. 4 - Gyokuei Maru fish-meal factoryship operating north and west of the Pribilofs.

Four of the Japanese fish-meal fleets returned to the Alaskan area for a short period from the middle to late September. The Gyokuei Maru, Soyo Maru, and Hoyo Maru fleets operated generally north and west of the Pribilofs, while the Tenyo Maru fleet fished between Unimak Pass and the Pribilof Islands. All of those fleets had left for Japan by the end of September.

None of the 3 Japanese whaling fleets previously seen operating in the vicinity of the Shumagin Islands westward along the Aleutian Chain were sighted during October.

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JAPANESE BERING SEA BOTTOMFISH CATCHES:

A report of a study by the Japan Northern Waters Bottomfish Mothership Council revealed that the total catch of the 14 bottomfish fleets operating in 1964 in the eastern and western Bering Sea far exceeded the 1963 catch. As of September 20, 1964, it was announced that the catches of those fleets totaled 394,000 metric tons, as compared to 311,000 tons in 1963. Alaska pollock 117,000 tons, flatfish 88,000 tons, herring 42,000 tons, and rockfish 38,000 tons led the landings. Catches of halibut (2,000 tons) and sablefish (6,000 tons) were poor as compared to previous years.

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KING CRAB HARVEST AT KODIAK AND WESTWARD:

Because the king crab harvest in the Kodiak area remained at a low level during October 1964 due to lack of facilities after the earthquake, only 14 tagged crabs were caught by commercial fishermen. A year earlier during October, over 200 tagged crab were taken. The commercial harvest of king crab west of Kodiak Island continued at a higher level than in previous years. Processing plants in the Shumagin Islands area operated at near-capacity. A new plant at Cold Bay began processing king crabs using an operation considered unique for a plant located so far westward. The crabs are cooked, cooled, and shipped by air to markets in other States where they are sold as fresh crab meat. Other processors in the area pack frozen or canned products.

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HERRING CATCH FLUCTUATIONS ANALYZED BY COMPUTER:

From computer analyses of the landings of Alaska herring over a period of years, it has been determined that the fluctuations in the catches have not always been due to fluctuations in year-class strength. The analyses cover the years 1929 to 1962 for southeast Alaska, 1937 to 1958 for Prince William Sound, and 1936 to 1959 for Kodiak Island.

With year-class fluctuations discounted, it is possible to assess the effects of other factors on the Alaska herring landings. The annual differences in the availability of herring to the fishermen and also in the catchability of herring by the fishing fleet are two important factors. In addition, there are variations in natural and fishing mortality that may contribute to fluctuations in the catches.

A plan for determining the role of fishing mortality in the seasonal fluctuations in Alaska herring landings is under study at the U.S. Bureau of Commercial Fisheries Biological Laboratory at Stanford, Calif.

Alaska Fishery Investigations

STUDIES ON PINK SALMON MIGRATIONS:

Extensive observations on juvenile pink salmon in Southeast Alaska were made by a biologist of the U.S. Bureau of Commercial Fisheries Biological Laboratory, Auke Bay, using the Bureau's research vessels Heron and Blue Boat. In the course of the studies a rendezvous was held with the Fisheries Research Institute vessel Commander working on offshore aspects of the same problem. Although the major migration of juvenile pink salmon into the Gulf from northern Southeastern Alaska in 1964 appeared to be south through Chatham Strait (and not through Icy Strait), many tagging experiments on adult pink salmon in past years have clearly demonstrated that the largest adult spawning runs enter northern Southeastern Alaska through Icy Strait. If juvenile salmon migrations in 1964 are characteristic of other years, an important discovery has been made bearing on salmon homing--the juveniles may be leaving coastal waters by one route and the adults returning to spawn by an entirely different route. This would eliminate the possibility of "retracing their steps" by memory.

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SEA WATER MAY ACCELERATE DEVELOPMENT OF PINK SALMON EMBRYOS:

Pink salmon eggs in the Bureau's Auke Bay Biological Laboratory exposed to simulated intertidal incubation conditions at the age of 2 weeks showed a significantly greater embryo head development than eggs exposed to fresh water. The intertidal simulation was obtained by introducing the sea water 4 hours every 12 hours. The results are still inconclusive, but the exposures to sea water caused no mortalities and resulted in slight acceleration in embryo development.

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SALMON SPAWNING BEDS UNSTABLE AFTER EARTHQUAKE:

Field work by the U.S. Bureau of Commercial Fisheries on 4 streams being studied in the Prince William Sound area show that stream bed adjustments as a result of the changes in land elevations following the earthquake are still occurring. Some spawning beds are stranded as new channels are formed during freshets. The behavior of the 1964 Prince William Sound pink salmon spawning migration, the first season after the earthquake, indicates no radical change in spawning behavior despite altered environments. Streams in uplifted areas have not yet reached equilibrium and are shifting their channels. New channel formation may account for some apparently low egg deposition. Uplift has brought former poor intertidal areas up to productive tide levels. But stream flow and digging by spawning salmon have not been sufficient to remove fines from these areas in all streams. In uplifted O'Brien Creek egg deposition was quite high but showed a reduction of live egg abundance from 163 per 0.1 square meter of stream bed to only 68 eggs just previous to hatching.

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KARLUK RED SALMON RUN INCREASES IN 1964:

An estimated 538,000 red salmon escaped into the Karluk system. A substantial bimodal fall run boosted the 1964 escapement to the second highest in 11 years. The average escapement since 1955 has been about 344,000 fish. The commercial catch for the Karluk district was 213,000 bringing the total run for 1964 to 751,000. An egg mortality study in the Grassy Point Creek tributary to Karluk Lake revealed an 8.8 million egg loss of the 10.5 million egg potential. The loss can not be explained by bear predation and will be investigated further. Since 1961, older smolts have become more numerous in the Karluk outmigration. The present dominant 3-plus age group constituted 66 percent of the 1964 outmigration. The 3-plus age group comprised only 6 percent of the 1961 outmigration. The significance of this shift in age group is not clear, but a similar change has also occurred in Bristol Bay runs.

American Samoa

TUNA PRICES:

The following prices for tuna delivered to the United States processing plants in American Samoa were agreed upon for November 1964 following negotiations conducted be-

tween Japanese trading firms and the United States packers located on that Island:

Species		US$/short ton
Albacore	(iced)	310
"	clipper (froz.) . . .	325
Yellowfin	(frozen)	285
Big-eyed under 90 lbs.	(frozen)	275

Note: The albacore are fish over 45 pounds and the yellowfin and big-eyed are gilled-and-gutted fish.

Source: Suisan Keizai Shimbun, November 8, 1964.

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JAPANESE TUNA VESSEL OPERATORS SEEK USE OF LARGER VESSELS:

The Japanese Overseas Tuna Fishery Cooperative Association (formed by vessel owners affiliated with a particular Japanese fishing firm), Japan, is seeking a change in the Japanese Government size restrictions on Samoan-based tuna vessels, from the present 180-gross ton limit to 240 gross tons. The Association members maintain that, despite the higher hook catch rate achieved in 1964 in the South Pacific as compared with 1963, the Japanese tuna fleet in American Samoa is dwindling because vessels under 180 gross tons cannot operate profitably due to the high costs of fuel and other supplies at that base. Moreover, they point out that the remarkable growth of the Korean fishing fleet in American Samoa and the resultant intensification of competition on the fishing grounds with Japanese vessels have dampened the enthusiasm of Japanese fishing crews to fish out of Samoa. To overcome these management problems and to increase operating efficiency, they are urging the Government to make special provisions permitting larger vessels to operate from that base.

The Government is not likely to act readily on this proposal since it feels that consideration should also be given to other matters, such as the condition of resources. (Suisan Keizai Shimbun, October 20, 1964.)

Cans--Shipments for Fishery Products, January-August 1965

A total of 1,918,909 base boxes of steel and aluminum was consumed to make cans shipped to fish and shellfish canning plants in January-August 1964, a decrease of 9.2 percent from the 2,114,241 base boxes used during the same period in 1963. The decline is due partially to a drop in the canning of jack mackerel and Maine sardines.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area 31,360 square inches, equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans are derived by use of the factor 23.5 base boxes per short ton of steel. (In the years 1962 and 1963, tonnage data were based on the factor 21.8 base boxes per short ton of steel.) The use of aluminum cans for packing fishery products is small.

Caribbean and Tropical Atlantic

FISHERY RESOURCE SURVEY CONTINUED:

M/V "Oregon" Cruise 94 (August 24-October 8, 1964): This 45-day cruise in the eastern Caribbean Sea by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon was the first in a series conducted in cooperation with the United Nations Special Fund Caribbean Fisheries Project. The cruise was also a continuation of the general Caribbean and Tropical Atlantic faunal survey and fishery resource evaluation started by the Bureau in 1957.

Preliminary survey coverage during the cruise was obtained in the general area of the Lesser Antilles and between Barbados and Aves Island. Fishing emphasis was placed on pelagic species using surface gear. Where

Fig. 1 - M/V Oregon docked at Fort-de-France, Martinique, in September 1964. This was one of the port calls made during cruise 94.

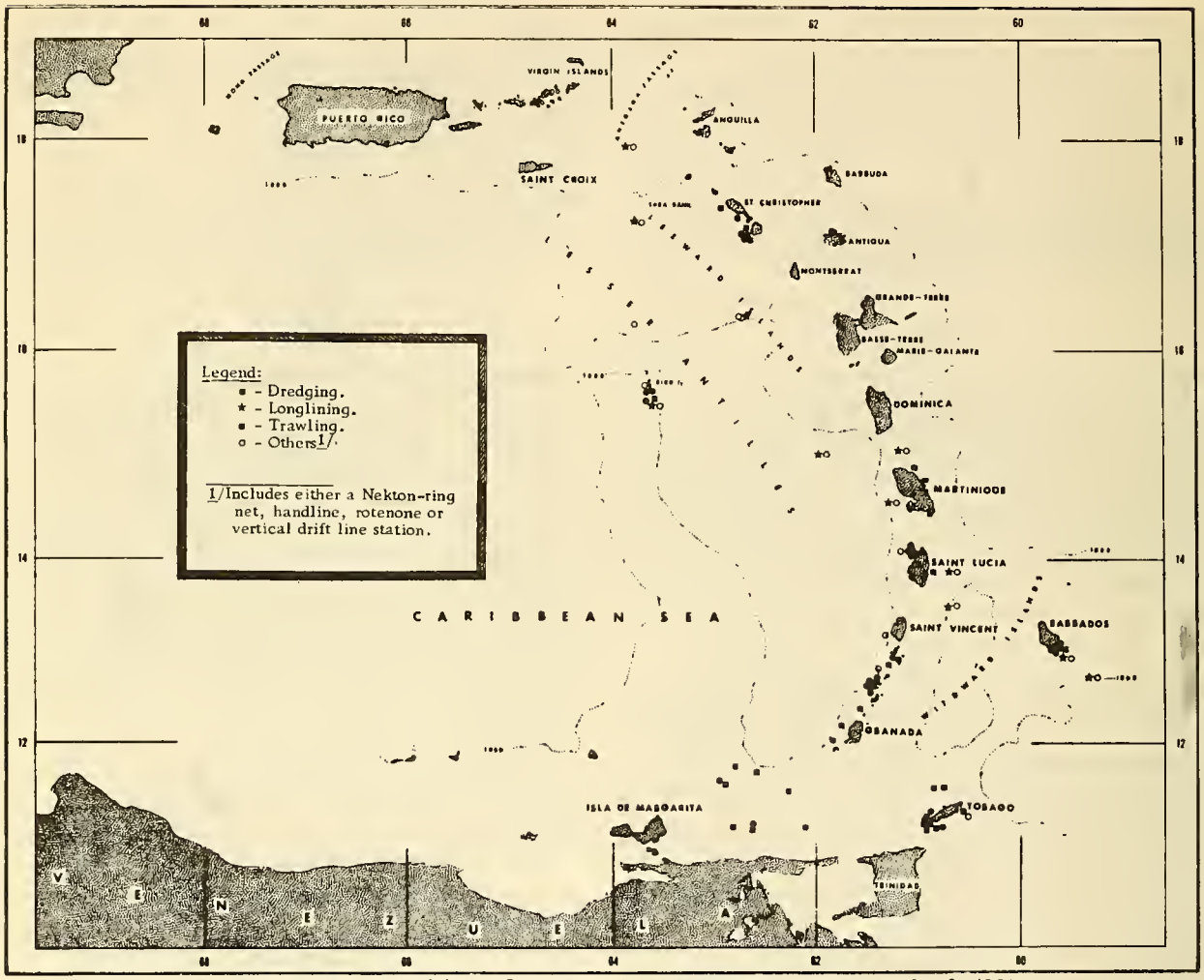

Fig. 2 - Areas investigated during Cruise 94 of the M/V Oregon, August 24-October 8, 1964.

possible, bottom fauna was explored with trawls and dredges. United Nations observers and trainees from various participating countries were aboard the vessel for different phases of the cruise.

Day and night long-line sets (500-600 hooks) were made at 11 localities in the survey area. Tuna catches were very poor. A few yellowfin (Thunnus albacares) and blackfin (T. atlanticus) were caught south of Saba Bank and east of St. Vincent Island, and two broadbill swordfish (Xiphias gladius) were caught on a night set north of Aves Island. Catches at the other long-line stations included small numbers of different shark species: white-tip (Pterolamiops longimanus), silky (Carcharhinus falciformis), blue (Prionace glauca), blacktip (C. limbatus), bigeye thresher (Alopias superciliosus), and mako (Isurus oxyrinchus). Also taken were 2 oilfish (Ruvettus pretiosus), 3 barracuda (Sphyraena barracuda), 1 wahoo (Acanthocybium solandri), 2 dolphins (Coryphaena hippurus), and 3 unidentified gempylids. A total of 20 bathythermograph (BT) casts was made in the long-line fishing areas. Two surface-feeding tuna schools (tentatively identified as blackfin) were observed off the east coast of St. Lucia.

A 1-meter nekton ring net was surface-towed as the long-line gear was set, and the collections were preserved for identification and further study at the Bureau's Biological Laboratory, Brunswick, Ga.

Night-light attraction tests were conducted at 4 stations off Cannouan Island in the Grenadine group. Dwarf herring (Jenkensia) and silversides (Atherinidae) were densely at-

Fig. 3 - M/V Oregon's port call to Fort-de-France attracted visitors.

Fig. 4 - Personnel aboard the M/V Oregon explain function of a dredge to Martinique newsmen while vessel was docked at Fort-de-France.

Fig. 5 - Two fish specimens caught by the M/V Oregon during cruise 94. The specimens had been frozen after being captured and were brought up on deck for showing to the visitors and newsmen while the vessel was at Fort-de-France.

tracted to the light. During one hour, 150 pounds were dip-netted and frozen for use as long-line chum.

Other species caught on trolling lines maintained while steaming between fishing stations were: 1 yellowfin tuna, 9 little tuna (Euthynnus alletteratus), 4 common dolphin, 5 great barracuda, and 1 cero mackerel (Scomberomorus regalis). Length, weight, sex, and stomach contents were recorded for each fish.

A total of 24 trawling and 38 dredging stations was made in the general vicinity of Barbados, Tobago, and Los Testigos and the western side of the Windward and Leeward Islands from Grenada to St. Christopher. Catches of 5 to 45 pounds of 10- to 16-count (heads-off) brown shrimp (Penaeus aztecus) per 60-minute drag with a 40-foot flat trawl were located in a limited area of trawlable bottom in 36 to 48 fathoms off the southwest end of Tobago. In depths ranging from 200 to 340 fathoms north of Tobago, various shrimp species of potential commercial value included red shrimp (Hymenopenaeus robustus, Aristaeus antillensis, and Penaeopsis megalops), scarlet shrimp (Plesiopenaeus edwardsianus, Aristaeomorpha foliacea), and striped shrimp

(Plesionika longipes). The best drag (200 to 240 fathoms) yielded 80 pounds of red shrimp of the P. megalops species (100 heads-off count), 40 pounds of the H. robustus species (26-30 heads-off count) and 10 pounds of lobsterettes (Nephrops binghami). In that general depth range, other invertebrates of potential commercial use included several pounds per drag of Polycheles sculptus and Geryon and other crabs. Also in that depth range, the catches were dominated by gadiforme fishes (Gadidae and Macrouridae) and deepwater apogonids (Synagrops sp.).

During the cruise, reef fishes were sampled at Aves and Cannouan Islands. One vertical drift-line station from the surface to 240 fathoms was attempted off St. Vincent, but with negative results. The vessel made port calls in Martinique, Barbados, and Trinidad to embark and debark observers and trainees taking part in the cruise. The vessel returned to its base on St. Simons Island, Ga.

Note: See Commercial Fisheries Review, September 1964 p. 22.

Central Pacific Fisheries Investigations

EXPERIMENTS ON TUNA RESPONSE TO OUTSIDE STIMULI:

Measuring the responses of tuna to external stimuli has been of interest for several years to scientists of the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii.

Experiments carried out in the Laboratory's large shoreside tanks have been undertaken to study the responses of skipjack, yellowfin, and little tuna to light, odor, and underwater sound.

In the summer of 1964, new experiments using new methods and techniques were successfully conducted. Two visiting scientists from New York City conducted electrophysiological and neuroanatomical studies of the lateral line system of spinalized skipjack tuna. The method involved immobilizing the fish and supplying it with oxygenated sea water through a plastic tube affixed to its mouth. The experiments were conducted in a small tank filled with sea water.

Electric recording of nerve impulses from the lateral line nerve was carried out successfully on several skipjack. A total of 20 skipjack was successfully immobilized as experimental animals for physiological studies--the first time this has been accomplished. The trunk lateral line system of the skipjack seemed to be very different from the systems possessed by many of the less active species of fish which had been investigated previously. A high sensitivity of the lateral line to low-frequency vibrations demonstrated for other species could not be demonstrated for the skipjack lateral line. The lateral line nerve fibers of skipjack could be made to respond with impulses by stimulating the organ fairly strongly with a flow of water or with a camel hair brush. Many observations of reflex body and fin movements reacting to touch stimuli were made during the work.

Complete dissections and drawing of the body lateral line nerve systems were made. Samples of the nerve at numerous sites were taken and were being prepared for detailed microscopic study. The work shows that the system of that nerve in the tuna possesses some interesting variations from those of other species of fish.

Several conclusions have been drawn from the work done: (1) it is possible to carry out physiological investigations on spinalized skipjack held in small containers; (2) the trunk lateral line system of skipjack does not appear to be used by the fish for detecting low-frequency sounds and its real use is still not known (it is possibly a skin stretch detector; and (3) the lateral line organ is innervated by a deeply lying nerve, the course and branches of which have been traced out.

Note: See Commercial Fisheries Review, May 1963 p. 24.

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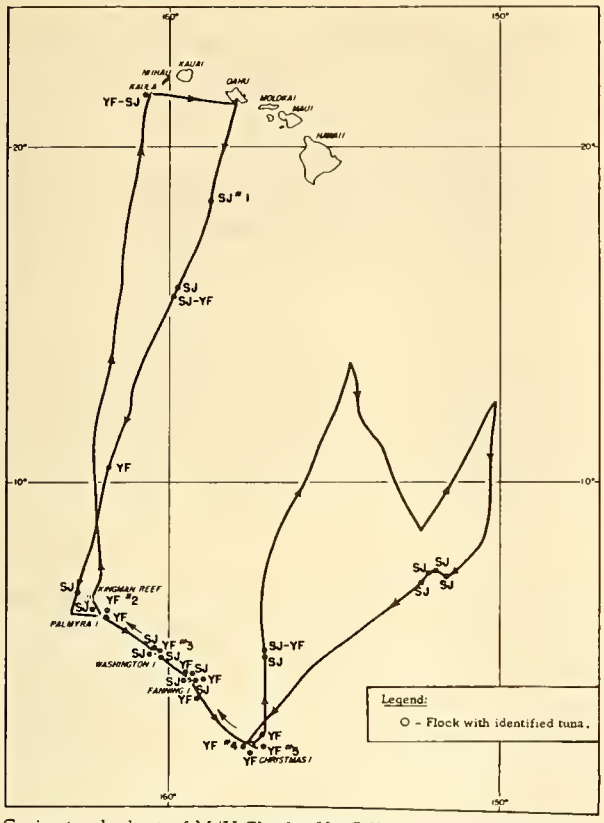
SKIPJACK TUNA BIOLOGICAL STUDIES CONTINUED:

M/V "Charles H. Gilbert" Cruise 76 (September 22-October 28, 1964): To search for skipjack tuna (aku), which occur in the Hawaiian Islands during the summer and all but disappear during the fall and winter, was the principal objective of this 5-week cruise by the research vessel Charles H. Gilbert, operated by the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii. Other related objectives of the cruise were to: (1) obtain blood and serum samples from skipjack and evaluate them aboard when possible; (2) maintain a standard watch for bird flocks; and (3) collect oceanographic data of various forms.



Cruise track chart of M/V Charles H. Gilbert, Cruise 76 (September 22 to October 28, 1964).

The research vessel's area of operations during the cruise was among the Line Islands and to an area east of those Islands, roughly 700 miles south of Oahu (about 6°30' N., 162° 30' W. to approximately 2°00' N., 157°30' W. and along the area of converging currents from approximately 8°30' N., to 13°30' N. and 158°00' W. to 150°00' W).

Skipjack tuna populations in the Pacific are divided into a number of reproductively isolated groups called subpopulations. At least two of those groups make up the skipjack catch of the Hawaiian pole-and-line fishing fleet. Those subpopulations can be identified by the fish's blood types using methods which are analogous to methods used to identify blood types such as A, B, AB, and O and the Rh factor in man.

Skipjack encountered during the cruise, both in the Line Islands and in the open ocean, were fished using Hawaiian pole-and-line methods. Fishing was very poor and few samples were obtained. An additional purpose of the cruise was to examine the blood types of the yellowfin tuna or "ahi," and compare them with the blood types of yellowfin in Hawaii. Yellowfin tuna fishing turned out to be excellent and sufficient numbers were caught to provide excellent samples. The results of the serological studies on those yellowfin suggest that those caught in the Line Islands were from a different subpopulation than those caught off Kaula Island, a small island near Niihau in the Hawaiian chain.

Serological and genetic studies of the skipjack and yellowfin tuna make it apparent that those species are grouped in several reproductively isolated subpopulations. The subpopulations are distributed in a yet to be discovered pattern across the Pacific.

During the cruise, a total of 14 skipjack schools (9 in the Line Islands and 5 in the convergence zone) were sighted but none were caught. Samples from 2 schools (117 skipjack) were obtained within 1 day's run of the Hawaiian Islands. One sample of 65 skipjack bloods and a total of 149 yellowfin bloods were processed on board the vessel. In addition, 30 absorptions were performed.

A total of 17 skipjack schools, 18 yellowfin schools, 2 mixed schools (yellowfin and skipjack), and 14 unidentified schools were observed.

A total of 121 yellowfin blood samples were collected in small vials containing glycerin solution, and 42 large volume yellowfin blood samples were collected in jars of glycerin solution to test the practicality of collecting frozen tuna blood samples. Serum samples of 109 yellowfin were collected. Many oceanographic observations were also made.

Note: See Commercial Fisheries Review, December 1964 p. 35.

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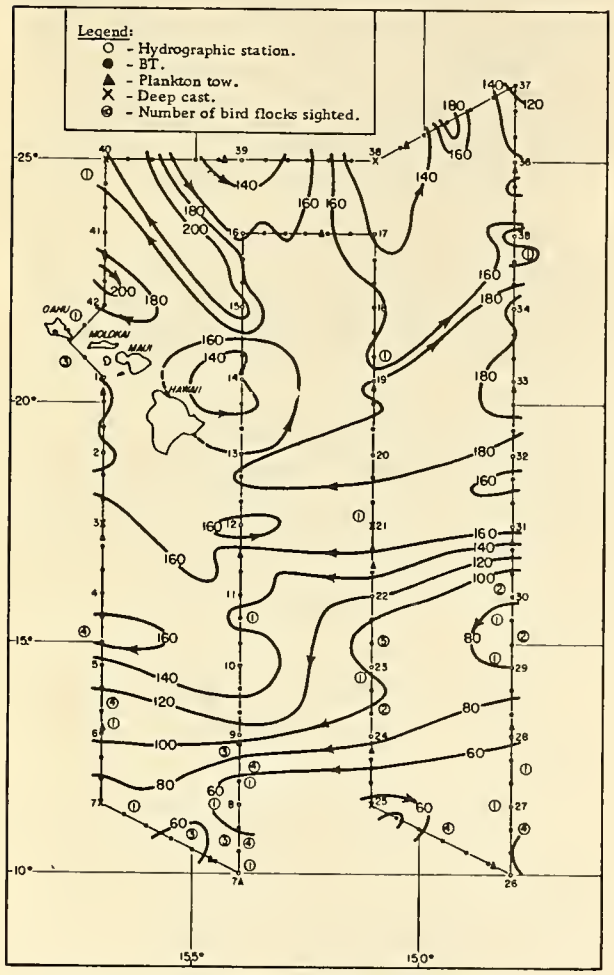
TRADE WIND ZONE OCEANOGRAPHIC STUDIES CONTINUED:

M/V "Townsend Cromwell" Cruise 9 (October 1-20, 1964): The eighth in a series of oceanographic cruises to determine rates of change in the distribution of properties in the trade wind zone of the central North Pacific Ocean was completed October 20, 1964, by the research vessel Townsend Cromwell. The vessel is operated by the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii. The area of operations was

in the Central North Pacific bounded by latitudes 10° N., 27° N. and longitudes 148° W., 158° W.



Track chart of the research vessel Townsend Cromwell Cruise 9 (October 1-20, 1964), showing depth contours of the 20° C. isotherm in meters.

A total of 43 oceanographic stations were occupied along the cruise track and station temperatures and samples for salinity analysis were obtained at 20 depths to 1,500 meters (about 4,100 feet). Deep casts to 4,000 meters (about 13,100 feet) were taken at stations 3, 7, 21, 25, 38, and 40, with an additional sample at 5,000 meters (16,400 feet) at station 21.

The surface circulation and the temperature distribution in the cruise area during October suggest continuing changes attributed to the onset of the winter situation. The heightened intensity of the westerly flow of the North Equatorial Current noted during September was still evident. The general pattern observed in the north was nearly the same with one significant change. A large counterclockwise eddy appeared just to the east of the Island chain. A similar eddy pattern was also evident in the area during the February 1964 survey (Townsend Cromwell Cruise 1). In the southern region, the depth of the mixed layer markedly decreased from that in the summer situation with the colder water moving much nearer the surface.

A total of 63 bird flocks were sighted during the cruise; 11 being associated with skipjack schools. The fish schools associated with the remaining 52 were not identified. The majority of the schools was located south of 16° N.; 4 of the schools were sighted near the Islands and 4 in the northern section of the cruise area.

During the cruise bathythermograms (BT) were obtained at 30-mile intervals along the cruise track. Other operations included: (1) obtaining surface bucket temperatures and water samples for salinity analysis at each BT observation; (2) made dissolved oxygen determinations for each water sample at stations 7A to 16, 26 to 37, station 39, and for the deep bottles of the cast at stations 25, 38, and 40; (3) released 10 plastic-enclosed drift cards at 30-mile intervals along the entire cruise track; and made other observations.

Note: See Commercial Fisheries Review, December 1964 p. 34.

Chesapeake States

FISHERIES LANDINGS, 1963:

The 1963 commercial catch of fish and shellfish landed in the Chesapeake States (Maryland and Virginia) was 430.2 million pounds valued at $29.5 million ex-vessel. That was a decrease of 91.3 million pounds (18 percent) and $4.1 million (12 percent) from the previous year due mainly to lower catches of menhaden, crab, and oysters.

In 1963, the Chesapeake catch of menhaden totaled 259 million pounds (down 68.9 million); blue crab landings totaled 66.1 million pounds (down 20.4 million); and the oyster harvest yielded 18.3 million pounds (down 1.7 million). Moderate decreases occurred in the 1963 catch of catfish and bullheads, croaker, scup, and white perch. How-

ever, Chesapeake tuna landings showed a striking increase in 1963 as purse-seine vessels landed 3.1 million pounds of bluefin, skipjack, and yellowfin at Maryland ports.

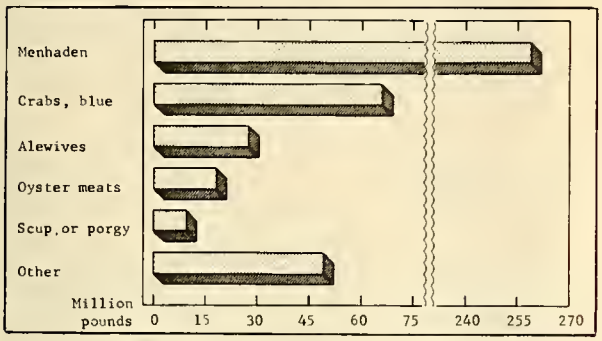


Fig. 1 - Chesapeake States catch, 1963.

Of the total landings in the Chesapeake States in 1963, Virginia produced 374.7 million pounds (87 percent) valued at $18.7 million (64 percent). The Maryland and Virginia catch was taken by 17,784 fishermen operating 1,274 vessels (craft of 5 net tons and over), 9,495 motor boats, and 888 other boats. The Chesapeake fishery included 65 sailing vessels of 5 net tons and over.

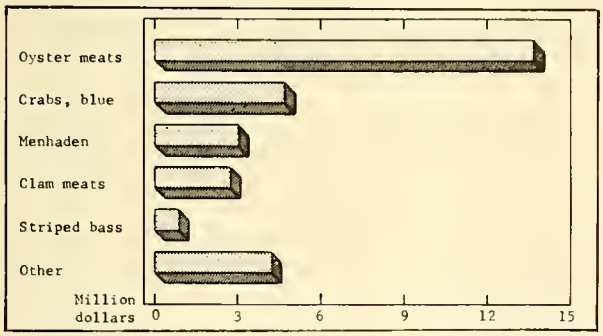


Fig. 2 - Value of Chesapeake States catch, 1963.

Virginia and Maryland produced manufactured fishery products with a total value in 1963 of $58.2 million at the processors' level--a decrease of $3.4 million from 1962.

Consumption

PER CAPITA FOOD CONSUMPTION (INCLUDING FISH) INDEX REVISED:

The "Per Capita Food Consumption Index" (includes fishery products) of the U.S. Department of Agriculture has been completely revised. The revised data for selected years since 1909 were published in Agriculture's National Food Situation, November 1964. Changes in that index include recombining quantities beginning with the year 1955 using retail prices in 1957-59 as index weights, use of marketing loss factors, the addition of Alaska and Hawaii since 1960, the addition of a few new commodities, and alteration of certain commodity groupings.

The per capita food consumption index is a retail-price-weighted quantity index. Average retail prices in 1947-49 were used to weight the index for all years through 1954. Beginning in 1955, average retail prices in 1957-59 were used as weights. The index was linked at 1955.

United States Civilian Per Capita Consumption of Fishery Products (Edible Weight), Selected Years 1947-64

Type	1/1964	1963	1962	1961	Average 1957-59	Average 1947-49
	(Pounds)					
Fresh and frozen	2/	5.8	5.8	6.0	5.7	5.7
Canned 3/	2/	4.3	4.4	4.3	4.2	4.1
Cured	2/	0.5	0.5	0.5	0.6	0.6
Total	10.7	10.6	10.7	10.8	10.5	10.4

1/Preliminary.
2/Not available.
3/Excludes canned food products containing small quantities of fish, such as clam chowder.
Note: Alaska and Hawaii included since 1960.

The 1957-59 prices were taken from those collected by the Bureau of Labor Statistics when they were appropriate, but many items were not priced by them, or at least not in the form in which quantities were measured. Since those prices are averages for products with rigid specifications for grade and form, it was necessary to adjust some prices to represent the average of all products consumed. Retail prices compiled by Statistical Reporting Service for use in the family living component of the Prices Paid Index sometimes were used since they relate to all products as purchased. It was necessary to use some price relationships derived from the 1955 Household Food Consumption Survey in adjusting prices from other sources or deriving composite prices. This survey covered farm and rural nonfarm as well as urban consumers.

The variation in the per capita consumption of fishery products from 1961 through 1964 has been almost insignificant. However, the amount of fishery products actually consumed has increased in order to take care of the substantial increase in population. (National Food Situation, NFS-110, November 1964, Food Consumption and Utilization Section,

Economic and Statistical Analysis Division, U.S. Department of Agriculture.)

Crab

UNITED STATES-JAPANESE TALKS ON KING CRAB FISHING IN EASTERN BERING SEA CONCLUDED:

Consultations between the United States and Japanese delegations on king crab fishing in the eastern Bering Sea, held at Washington, D. C., starting October 15, 1964, were successfully concluded, announced the State Department on November 14, 1964. The delegations agreed to recommend to their respective Governments arrangements to govern the king crab fishery of both countries in the eastern Bering Sea for a period of two years, at the end of which time the two Governments would undertake to hold further similar consultations.

Included in the proposed agreement are: (1) provisions for a level for the Japanese king crab catch in the area of the traditional Japanese fishery in the eastern Bering Sea, (2) interim conservation measures to be applied to the fishermen of both countries in the area, (3) continued and intensified scientific study of the king crab resource, and (4) enforcement of the terms of the agreement. In order to minimize the possibilities of conflict resulting from the differing types of fishing gear, the agreement would specify an area in which only crab pots would be used for commercial crab fishing.

Alaska king crab (Paralothides camachatica)

The consultations were held in fulfillment of the pledge made by President Johnson May 1964 that before implementing the provisions of Public Law 88-308 (the so-called Bartlett Act), the United States would consult with Japan and would give full consideration to Japan's long established king crab fishery. Faced with the opposing legal positions of the two Governments regarding rights under international law to fish the king crab resource, the two delegations agreed on practical arrangements without prejudice to the legal position of either side.

* * * * *

CONFERENCE ON TECHNOLOGY OF KING CRAB PROCESSING:

A two-day conference on the technology of king crab processing was held October 19 and 20, 1964, at the U. S. Bureau of Commercial Fisheries Technological Laboratory, Ketchikan, Alaska. A similar conference on king crab was held in 1962 at the same location. The conference was attended by about 40 fishery industry people representing a wide range of interests in the king crab fishery.

The conference agenda was divided into six major sessions according to the subject matter of the topics. The first session was of a general nature for the purpose of providing information on the conservation of the king crab resource, foreign interests and their utilization of the resource, and the results of some

Washing and checking meat removed from king crabs in a plant in Alaska.

preliminary exploratory fishing efforts by the Bureau. The first and second technical sessions centered on technological research progress on problems related to the processing of king crab. Lively discussions followed each research progress report since some of the reports provided information that is significant and has immediate applicability by the industry.

The third technical session provided information on Bureau technological research programs which were of indirect interest to the king crab industry. The topics in this session covered research progress on Dungeness crab processing, mechanization of the blue crab industry, and the need for maintaining a sanitary operation in the production of all types of crab meat.

The final two sessions of the conference were of workshop type in which samples of canned and frozen crab meat were examined and evaluated. The purpose of the product cuttings was to observe specific product defects and to discuss processing variables which may influence their occurrence. The consensus was that the quality of crab meat had increased over the average quality level of two years earlier.

A panel of industry representatives was selected at the beginning of the conference to evaluate the conference itself, and to provide some guidelines to the Bureau with respect to the future direction of research on king crab. The panel lauded the work that has been accomplished to date, requested a balanced future program of basic and applied research on king crab, and requested that a third king crab conference be scheduled within the next two years.

* * * * *

ECONOMIC AND MARKETING STUDY OF DEEP-SEA RED CRAB UNDERTAKEN:

A marketing and economic study of the commercial potential of the deep-sea red crab has been undertaken by a University of Rhode Island fisheries economist, announced the University's Director of Public Information, November 13, 1964. Found along the Continental Shelf, ranging from Nova Scotia to Cuba, the deep-sea red crab is now dumped back into the sea by offshore lobstermen who consider them a nuisance.

The University's associate professor of food and resource economics conducting the study said, "If I had a choice between red crab and lobster, I would take the crab. There's no doubt about it in my mind." He obviously speaks from experience, having eaten that species of crab since last fall.

when he arrived in the United States from Rome, Italy, where he had been with the United Nations' Food and Agriculture Organization (FAO).

Bright red when alive and possessing a delicate flavor, the crabs caught by trawlers weigh between 1 and 2 pounds and are about twice the size of the blue crabs which are the mainstay of a substantial industry in the Chesapeake Bay area. Catches of 3,000 to 4,000 pounds of the red crab have been obtained in a one-hour tow. In contrast, it takes an 80- to 90-foot vessel operating out of Rhode Island ports 4 nights and days of trawling to obtain an average catch of 8,000 pounds of lobster.

From the two dozen red crabs cooked and dissected at the University of Rhode Island Agricultural Experiment Station, it was found that 3 average size ones yield about 1 pound of meat. About 24 percent of the meat was in the claws, 36 percent in the legs, and 40 percent in the body. A taste panel, established by the Technological Laboratory of the U.S. Bureau of Commercial Fisheries at Gloucester, Mass., had previously judged the quality, texture, and palatability of crabs cooked at sea and immediately frozen as "good." On another occasion a Rhode Island fish and shellfish dealer hand-picked about 500 pounds of the meat and sold it at retail both in the fresh and frozen form.

Despite the encouraging evidence, the economist making the study is not yet ready to suggest the red crab will form the basis for a new industry. But he does believe that if several major problems can be solved, then New England offshore lobstermen might find red crab fishing profitable because they are already equipped for the deep-sea trawling necessary. "Since the offshore lobster season is limited to the first half of the year, trawling for crabs during fall and early winter might be a satisfactory complementary activity which could offset the seasonability of employment in the lobster industry both at sea and ashore," he explained.

Normally, the crabs are found in waters of more than 200 fathoms (1,200 feet) with the density very great at 250 fathoms. Whether the crabs reproduce fast enough and exist in sufficient numbers to stand up to extensive fishing is not known. Yet today the crabs which seem to congregate in pockets are sometimes caught in such quantities that "lobster boats leave an area to avoid catching them," the economist said. The problems to be solved, according to the economist, are how to preserve the catch and how to process it cheaply once it gets ashore. Unlike the lobster, he does not believe the red crab will survive for extended periods in salt-water tanks aboard ship. This suggests that some method will have to be found to ice the catch. But how long will they last on ice? Will the keeping quality vary from season to season? Would it be better to ice down the catch as it comes aboard or should the catch be bagged first and then iced to reduce handling costs and expedite unloading in port? Will extra crew members be required?

The red crab has a softer shell than lobsters, somewhat elongated spidery legs, and often loses a claw or a leg during the rough ride when it is scooped off the bottom and dumped aboard the vessel. Of the samples brought to the University for study, only 10 percent of the crabs were intact. The damaged ones are liable to die and spoil any whole crabs in a salt-water tank. The second hurdle to be cleared involves finding an economical way of removing the meat from the shell. In the Chesapeake Bay area hand-picking is done, but the economist said the comparatively high costs of labor in Rhode Island and New England might preclude a similar setup. Possible alternatives include shipping the red crabs to an area where experienced hand pickers can be used at a reasonable cost or adapting present mechanical equipment used to remove meat from blue crabs. In addition, the economist believes there may be a way of marketing whole deep-frozen crabs, after the shell has been opened and it has been cleaned inside.

Limited explorations of the distribution of the red crab were carried out in 1959-1960 by the U.S. Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base at Gloucester, Mass. In December 1963 the U.S. Bureau of Commercial Fisheries published Fishery Leaflet 550 which stated, "As trawlers become equipped for fishing in greater depths, this species may become the source of a commercial fishery. At present, the deep-sea red crab remains an untouched resource of unknown value and extent."

Local fishermen and fish and shellfish dealers have already expressed an interest in the red crab study and volunteered their assistance. Meanwhile, the University's economist has been communicating with blue crab processors in the Chesapeake Bay area and will visit them. He expects the initial phase of his work to take about a year. (Press Release of University of Rhode Island, Kingston, November 13, 1964.)

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-OCTOBER 1964:

Fresh and Frozen: Purchases of fresh and frozen fishery products in October 1964 for the use of the Armed Forces were down 15 percent in quantity from the previous month, although the value of the purchases was about the same in both months. In October 1964 purchases were up for shrimp, but down for scallops, ocean perch fillets, and haddock fillets and portions. Average prices in October 1964 were higher for shellfish items--particularly for peeled and deveined shrimp.

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, October 1964 with Comparisons

QUANTITY				VALUE			
Oct.		Jan.-Oct.		Oct.		Jan.-Oct.	
1964	1963	1964	1963	1964	1963	1964	1963
(1,000 Lbs.)				($1,000)			
2,252	1,817	22,330	19,490	1,484	975	12,303	10,917

Compared with the same month in the previous year, purchases in October 1964 were up 24 percent in quantity and 52 percent in value. Among the leading items, shrimp purchases showed the largest increase in spite of a substantial gain in price. The upward trend in prices for most items in October 1964 was partly offset by lower average prices for ocean perch fillets, haddock fillets, and oysters.

Total purchases in the first 10 months of 1964 were up 15 percent in quantity and 13 percent in value from those in the same period of the previous year. Purchases of shrimp and scallops showed the largest increase. There was some decline in purchases of cod fillets, ocean perch fillets, halibut steaks, and swordfish steaks.

Table 2 - Purchases of Principal Fresh and Frozen Fishery Products by Defense Subsistence Supply Centers, October 1964 with Comparisons

Product	October				January-October	
	1964		1963		1964	1963
	Quantity	Avg. Cost	Quantity	Avg. Cost	Quantity	
	Pounds	Cents/Pound	Pounds	Cents/Pound	. . . . (Pounds)	
Shrimp:						
Raw headless	133,850	90.6	1/	1/	1,104,400	1/
Peeled and deveined	258,414	120.4	1/	1/	1,319,036	1/
Breaded	343,370	83.2	1/	1/	3,519,220	1/
Molded and breaded	71,550	60.9	1/	1/	421,320	1/
Total shrimp	807,184	94.4	663,080	78.4	6,363,976	5,681,744
Scallops	111,200	63.5	101,100	55.6	2,422,350	2,163,207
Oysters:						
Eastern	78,227	109.5	1/	1/	707,541	1/
Pacific	57,610	66.3	1/	1/	292,682	1/
Total oysters	135,837	91.2	101,502	95.7	1,000,223	985,225
Clams	7,450	31.2	17,772	29.8	223,353	219,142
Fillets:						
Cod	70,750	33.5	77,740	28.3	453,216	566,425
Flounder	253,150	27.7	225,000	26.6	2,696,652	2,614,927
Ocean perch	269,300	28.6	246,190	32.0	3,060,720	3,178,841
Haddock	67,700	32.2	182,800	35.4	1,651,554	1,849,376
Haddock portions	102,358	45.6	-	-	439,822	-
Steaks:						
Halibut	116,200	44.8	86,100	37.8	1,132,327	1,194,173
Salmon	55,170	66.7	20,100	56.7	228,445	163,750
Swordfish	775	59.2	1,680	55.0	11,410	25,748

1/Breakdown not available.

Canned: The purchases of canned fishery products in October 1964 included over 2 million pounds of canned salmon. That was the first large purchase of canned salmon by the Department of Defense since January 1964. In recent years most of the canned salmon requirements of the Armed Forces have been purchased in the fall of the year. Purchases of other canned fishery products are spread more evenly over the year.

Table 3 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, October 1964 with Comparisons

Product	QUANTITY				VALUE			
	Oct.		Jan.-Oct.		Oct.		Jan.-Oct.	
	1964	1963	1964	1963	1964	1963	1964	1963
	. . . . (1,000)				. . . . ($1,000)			
Tuna	530	281	4,812	2,992	229	123	2,136	1,420
Salmon	2,068	1,448	2,749	1,478	1,213	875	1,630	895
Sardine	33	24	293	399	19	8	172	158

In the first 10 months of 1964, total purchases of the 3 principal canned fishery products (tuna, salmon, and sardines) were up 61 percent in quantity and 59 percent in value due to larger purchases of canned tuna and salmon.

Notes: (1) Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than shown because data on local purchases are not obtainable.

(2) See Commercial Fisheries Review, Dec. 1964 p. 37.

Fish Sticks and Portions

U.S. PRODUCTION, JULY-SEPTEMBER 1964:

United States production of fish sticks and fish portions amounted to 42.1 million pounds during the third quarter of 1964, according to preliminary data. Compared with the same quarter of 1963, this was an increase of 4.8 million pounds or 12.9 percent. Fish portions (25.5 million pounds) were up 4.6 million pounds or 22.3 percent, and fish sticks (16.6 million pounds) were up 167,000 pounds or 1.0 percent.

Cooked fish sticks (15.1 million pounds) made up 90.7 percent of the July-September 1964 fish stick total. There were 25.0 million pounds of breaded fish portions produced, of which 20.0 million pounds were raw. Unbreaded fish portions amounted to 474,000 pounds.

The Atlantic States remained the principal area in the production of both fish sticks and fish portions, with 12.5 and 15.0 million pounds, respectively. The Pacific States ranked second with 2.2 million pounds of fish sticks, and the Inland and Gulf States ranked second with 9.8 million pounds of fish portions.

Table 1 - U.S. Production of Fish Sticks by Months and Type, July-September 1964 1/

Month	Cooked	Raw	Total
	. . . (1,000 Lbs.) . . .		
July	3,413	401	3,814
August	5,689	624	6,313
September	5,950	521	6,471
Total 3rd Qtr. 1964 1/	15,052	1,546	16,598
Total 3rd Qtr. 1963	15,252	1,179	16,431
Total 1st 9 months 1964 1/	48,992	4,312	53,304
Total 1st 9 months 1963	55,381	3,319	58,700
Total Jan.-Dec. 1963	74,132	5,163	79,295

1/Preliminary.

Table 2 - U.S. Production of Fish Sticks by Areas, July-September 1964 and 1963

Area	1/1964		2/1963	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	23	12,528	21	12,972
Inland & Gulf States	5	1,865	7	1,883
Pacific Coast States	11	2,205	11	1,576
Total	39	16,598	39	16,431

1/Preliminary.
2/Revised.

Table 3 - U.S. Production of Fish Sticks by Months, 1960-64

Month	1/1964	2/1963	1962	1961	1960
		(1,000 Lbs.)			
January	7,226	7,554	6,082	6,091	5,511
February	7,061	8,241	6,886	7,097	6,542
March	6,963	8,053	7,656	7,233	7,844
April	5,941	6,546	5,719	5,599	4,871
May	5,422	5,750	5,643	5,129	3,707
June	4,093	6,125	5,117	4,928	4,369
July	3,814	4,870	3,740	3,575	3,691
August	6,313	5,696	5,760	6,927	5,013
September	6,471	5,865	6,582	5,206	5,424
October	-	8,128	6,698	6,133	6,560
November	-	6,471	6,305	6,288	6,281
December	-	5,996	6,027	5,618	5,329
Total	-	79,295	72,217	69,824	65,142

1/Preliminary.
2/Revised.

Table 4 - U.S. Production of Fish Portions by Months and Type, July-September 1964 1/

Month	Breaded			Unbreaded	Total
	Cooked	Raw	Total		
		(1,000 Lbs.)			
July	768	5,654	6,422	105	6,527
August	1,706	7,363	9,069	256	9,325
September	2,522	6,983	9,505	113	9,618
Total 3rd Qtr. 1964 1/	4,996	20,000	24,996	474	25,470
Total 3rd Qtr. 1963	3,832	16,221	20,053	776	20,829
Total 1st 9 mos. 1964 1/	15,481	58,220	73,701	1,733	75,434
Total 1st 9 mos. 1963	12,052	54,903	66,955	2,229	69,184
Total Jan-Dec. 1963	16,623	74,970	91,593	3,054	94,647

1/Preliminary.

Table 5 - U.S. Production of Fish Portions by Months, 1960-1964

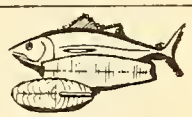
Month	1/1964	2/1963	1962	1961	1960
		(1,000 Lbs.)			
January	8,526	8,173	5,077	4,303	3,632
February	8,397	7,361	6,360	4,902	3,502
March	8,584	8,835	7,036	5,831	4,706
April	8,064	7,919	6,408	4,484	3,492
May	8,136	7,293	5,818	3,879	3,253
June	8,257	8,774	6,137	4,039	3,995
July	6,527	4,524	4,679	3,962	4,088
August	9,325	6,684	6,687	4,963	3,558
September	9,618	9,621	7,180	5,745	4,631
October	-	9,877	9,871	6,759	5,275
November	-	8,136	7,406	5,789	4,790
December	-	7,450	6,019	5,191	4,459
Total	-	94,647	78,678	59,847	49,381

1/Preliminary.
2/Revised.

Table 6 - U.S. Production of Fish Portions by Areas, July-September 1964 and 1963

Area	1/1964		2/1963	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	23	15,047	23	10,997
Inland & Gulf States	6	9,769	10	9,124
Pacific Coast States	9	654	9	708
Total	38	25,470	42	20,829

1/Preliminary.
2/Revised.

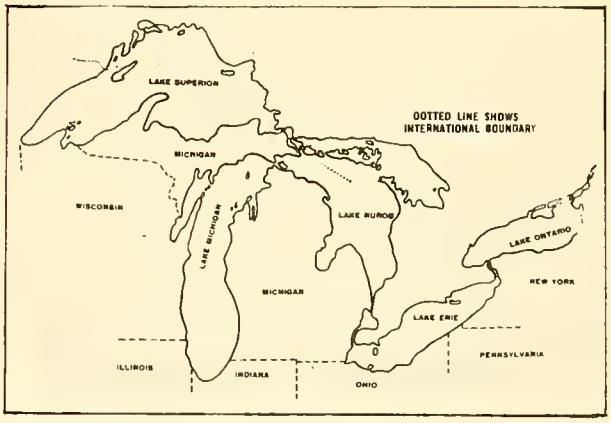


Great Lakes

FISHERY LANDINGS, 1963:

The 1963 United States and Canadian commercial catch of fish in the Great Lakes, Lake St. Clair, and the International Lakes of northern Minnesota was 106 million pounds. Landings declined over 17 million pounds compared with 1962. Domestic production accounted for 56 percent of the total volume.

United States fishermen took 59 million pounds of fish valued at $5.3 million from those lakes in 1963. The quantity declined 6.6 million pounds (10 percent) and value, $244,000 (4 percent) compared with the previous year. There were slight decreases in the catch of carp, chubs, and lake herring; while moderate increases occurred in landings of sheepshead and smelt.



The State of Michigan led with a catch of over 20 million pounds (2 million pounds less than the previous year). Wisconsin was next with landings of 17 million pounds (down 2 million from 1962). Ohio was third with a catch of 14 million pounds (down 1 million from 1962).

Lake Michigan was the leading contributor to the United States catch (for the fourth successive year) with a yield of 21.0 million pounds--down 2.5 million pounds from 1962. Lake Erie was second with 17 million pounds, followed by Lake Superior with landings of 12 million pounds. The Lake Erie landings fell more than 2 million pounds below the 1962 level, but the Lake Superior catch was about the same as in the previous year.

Great Lakes Fisheries Explorations and Gear Development

SEASONAL DISTRIBUTION AND ABUNDANCE STUDIES OF ALEWIFE, CHUB, AND YELLOW PERCH IN LAKE MICHIGAN CONTINUED:

M/V "Kaho" Cruise 22 (October 19-28, 1964): To extend knowledge of the seasonal distribution and abundance of alewife and chub stocks in northern Lake Michigan and Green Bay, and their availability to bottom trawls, was the primary objective of this cruise by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel Kaho. Other objectives were to collect length-frequency data on chub, alewife, and yellow perch, and to collect various species of fish and bottom samples for botulism studies.

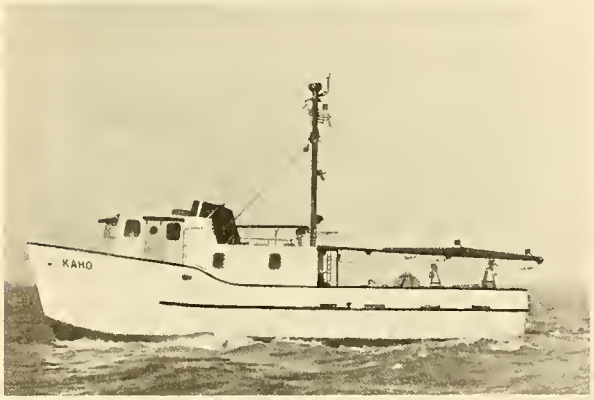


Fig. 1 - Exploratory fishing and gear research vessel Kaho of the U.S. Bureau of Commercial Fisheries.

These explorations by the vessel Kaho revealed commercially significant quantities of alewife to be available in central Green Bay, off Sturgeon Bay, Wis., Frankfort, Mich., and in Little Traverse Bay. Good catches of chub were made off Sturgeon Bay and Frankfort. This information is of special interest to those segments of the fishing industry looking for means to extend the production season for supplying animal-food and fish-meal market outlets.

Fishing Operations: A total of 45 trawl drags were completed with a 52-foot (headrope) fish trawl during the 10-day cruise. Of the total drags, 18 were completed in Green Bay and 27 in the open lake. All drags lasted 30 minutes except 5 drags, which were terminated early due to snags encountered or for comparison purposes with a previous drag. Heavy trawl damage requiring replacement of the net occurred at 15 fathoms southwest of Washington Island. Minor net damage was encountered on four other occasions. Bottom topography and vertical distribution of fish were continuously monitored and recorded with a high-resolution echo-sounder. Echo-sounding surveys made in the east arm of Grand Traverse Bay indicated most of the area to be unsuitable for bottom trawling.

Fishing Results in Northern Lake Michigan: Commercially significant catches of alewife were taken at 20, 25, and 30 fathoms off Frankfort, Mich.; at 15, 20, 50, and 70 fathoms off Sturgeon Bay, Wis.; and at 20 and 25 fathoms in Little Traverse Bay. Good chub catches were made at 30-45 fathoms off Sturgeon Bay and at 25 fathoms off Frankfort. A good percentage of the chub taken off Frankfort and Sturgeon Bay were large smoker size. One significant catch of sucker (130 pounds) was taken at 35 fathoms in Little Traverse Bay. Smelt were taken in moderate amounts with one drag in 30 fathoms off Sturgeon Bay yielding 90 pounds. No white fish and only 5 individual yellow perch were caught in northern Lake Michigan.

Fishing Results in Green Bay: Catches of alewife were generally light throughout Green Bay with the best catches (500 and 520 pounds) made at 12 fathoms at stations off Washington Island and east of Cedar River. Smelt catches were also light and mostly under 20 pounds for each drag. One drag at 13 fathoms off Cedar River yielded 190 pounds of smelt. South of Menominee, an average of 19 pounds of sucker per drag was taken. Sucker were scarce north of Menominee with the exception of one 300-pound catch taken at 13 fathoms east of Cedar River. Yellow perch were caught in amounts from 1 to 5 pounds in all drags made in southern Green Bay. But no perch were caught at

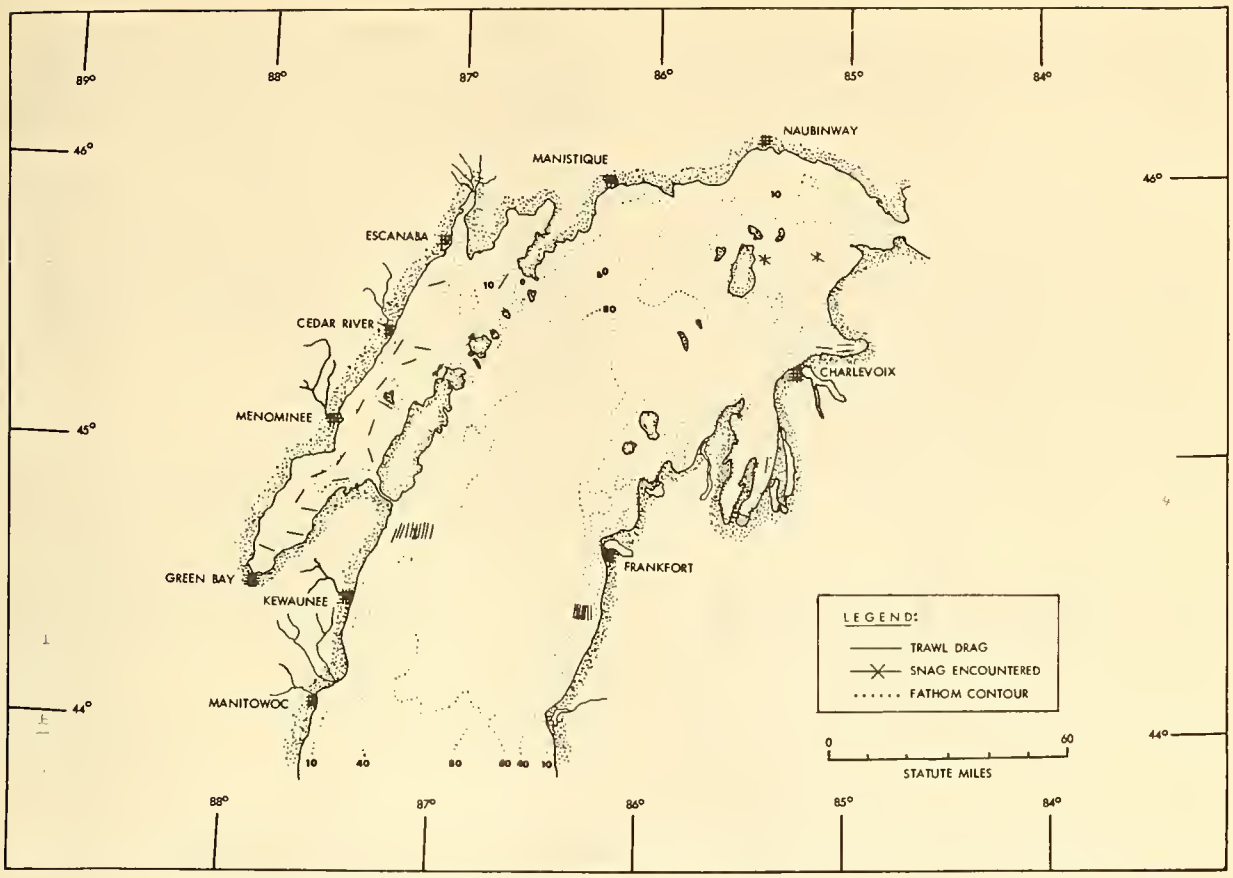


Fig. 2 - Lake Michigan and Green Bay explorations by M/V Kaho cruise 22, October 19-28, 1964.

any stations north of Menominee. Two significant catches of carp (100 and 1,300 pounds) were made in Green Bay at 15 and 10 fathoms, respectively. Catches of other species were insignificant.

Hydrographic data: Surface water temperatures of Lake Michigan ranged from 48.0° to 53.0° F; those in Green Bay from 46.5° to 50.5° F. No thermocline was present in Green Bay, and bottom temperatures varied from 44.6° to 47.4° F. Fishing (bottom) temperatures in Lake Michigan ranged from 39° to 47.4° F. Air temperatures ranged from 39° to 62° F. Bathythermograph (BT) casts were made at each fishing area.

Note: See Commercial Fisheries Review, December 1964 p. 40; November 1964 p. 33.

Gulf Fisheries Explorations and Gear Development

SHRIMP GEAR STUDIES CONTINUED:

M/V "George M. Bowers" Cruise 51--Phase I (September 3-6, 1964), Phase II (September 15-23, 1964): To initiate evaluation of daytime effectiveness, in clear water, of a trawl designed specifically for electrical shrimp trawling was the primary objective of this cruise in the Gulf of Mexico by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel George M. Bowers. A secondary objective was to determine efficiency in night fishing.

Previous daytime tests with an electrical shrimp trawl have yielded excellent results when used in turbid water, but relatively poor results in clear water. Daytime effectiveness on pink shrimp in the Cape San Blas area was much better than experienced previously. Electrical trawl catches were variable--ranging to 100 percent of shrimp available. Night elec-

trical catches of pink shrimp averaged 25 percent below those of the standard trawl. Daylight tests, on brown shrimp, in the Mississippi area ranged to 90 percent of shrimp available. Night catches were between 99 and 137 percent of the standard trawl rate.

Significant design features of the experimental trawl are: a transverse electrode array with an electrical field length of about $8\frac{1}{2}$ feet, a "mud-roller" assembly displayed ahead of the array, and a trawl shaped so that both array and "mud-rollers" are covered by an overhang of the top body section. The purpose of the "mud-roller" assembly is to create a layer of turbid water immediately above the electrode array. The object of the turbidity is to elicit a vertical response from the shrimp rather than the lateral movement obtained when visibility is good.

Comparative trawling methods used were the same as those on previous tests of the electrical shrimp trawling gear, consisting of the experimental gear being towed simultaneously with a standard trawl. Four 1-hour drags were made each day during daylight and four were made after dark. The standard for evaluation purposes was the average catch of the standard trawl night drags (night standard average).

Phase I: This phase was conducted in the Cape San Blas area due south of Cape St. George in 12 to 13 fathoms of water. Only pink shrimp were taken in that location. Shrimp availability was extremely variable due to bottom currents and variable substrate type. The night standard average during the test period ranged between 5 and 31 pounds an hour. The electric trawl daytime catch ranged between 50 and 100 percent of the night standard average. Those results, under clear water conditions, were much better than achieved previously, when electric catches were only 10 to 50 percent of the night yield. Night electric catches were 10 to 20 percent below the standard trawl rate, indicating electrically-induced escapement.

Phase II: The second phase of the cruise was conducted south of Horn Island Pass, Miss., in 13 to 14 fathoms. The catch was composed primarily of brown shrimp. The night standard average catch for the 4 days of testing was 25 pounds an hour with no extreme variability. The day electric catch ranged from 30 to 90 percent of the night standard average. The catches were directly related to degree of footrope proximity to bottom--when fished light, the catch was poor and when fished harder the catch improved. Night electric catches were 100 to 133 percent of the standard trawl.

In summary, results of this cruise demonstrated that creating a turbid water layer above the electrode array was effective in improving daylight electric catches in clear water. Also, a distinct variability in response between pink and brown shrimp was strongly indicated. This was demonstrated by results of night electric fishing.

After modifications to the design of the trawl used, an exploratory cruise to the Tortugas shrimp grounds was to be conducted by the George M. Bowers during the late fall of 1964. Primary objectives were to be: continued evaluation of daylight electric shrimp trawling on pink shrimp using the "mud-roller" device described, and to remedy the catch reduction experienced at night with that shrimp species.

Note: See Commercial Fisheries Review, July 1964 p. 12; April 1964 p. 18.

Gulf Fishery Investigations

SHRIMP DISTRIBUTION STUDIES:

M/V "Gus III" Cruise GUS-22 (October 20-31, 1964): Better than average individual catches of large brown shrimp averaging about 65 pounds, and a good catch of large and medium size white shrimp were made on this shrimp sampling cruise in the Gulf of Mexico by the chartered research vessel Gus III. The cruise was one of a series in a continuing shrimp distribution study conducted by the U.S. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Tex.

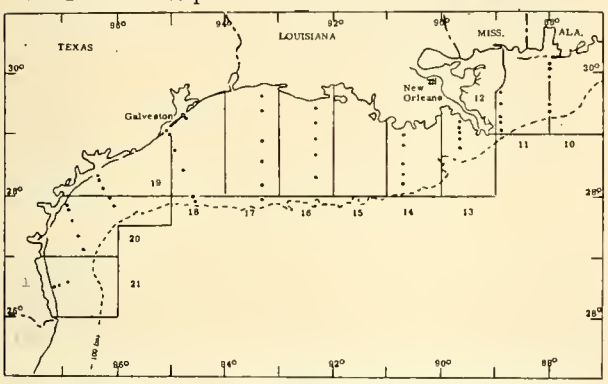
Eight statistical areas from off the Mississippi coast to Texas were covered on this cruise and standard 3-hour tows with a 45-foot Gulf shrimp trawl were made. During the cruise, 35 tows with the 45-foot flat trawl were made, 59 plankton tows, and 42 bathythermograph and 167 water (Nansen bottle) samples were taken. A total of 162 drift bottles were cast at 27 stations.

The largest catch yielding 66 pounds of 15-20 count brown was made in the over 20-fathom depth of area 20; the up to 10-fathom depth

range yielded 14 pounds of 15-20 count white shrimp.

The over 20-fathom depth was the most productive in area 16 with a 63-pound catch of 26-30 count brown shrimp. The other two depths in that area accounted for only a scattering of brown and white shrimp.

Area 21 accounted for 51 pounds of brown shrimp--30 pounds of 31-40 count from the over 20-fathom depth and 21 pounds of smaller size shrimp from 10-20 fathoms.



Station pattern for shrimp distribution studies by M/V Gus III, Cruise GUS-22.

A 69-pound catch of large white shrimp was made in area 13, most of it from the up to 10-fathom depth. The catch in area 14 was made up of 20 pounds of white shrimp (21-25 count) from the up to 10-fathom depth and 21 pounds of brown shrimp, ranging from 15-20 count to very small, from the other two depth ranges.

Notes: (1) Shrimp catches are heads-on weight; shrimp sizes are the number of heads-off shrimp per pound.
(2) See Commercial Fisheries Review, December 1964 p. 45.

Halibut

"GREENLAND HALIBUT" CORRECT NAME FOR THAT FLATFISH SPECIES:

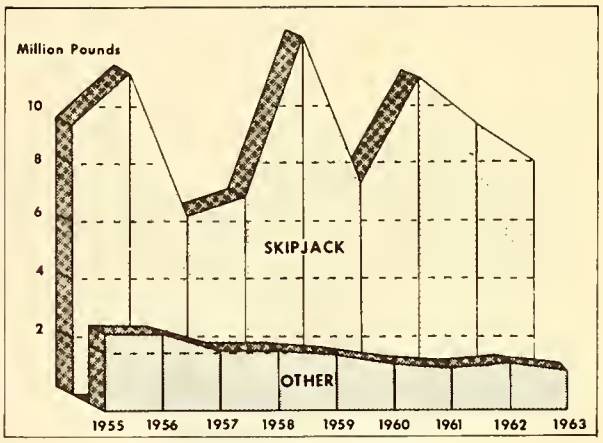
The U.S. Food and Drug Administration (FDA) has determined that the flatfish "Greenland halibut" (Reinhardtius hippoglossoides) bears the proper name and is not "flounder" as an FDA 1963 opinion stated. FDA officials say this new opinion cancels their 1963 opinion which was in error, and that "Greenland halibut" has been the proper name since 1946. Some literature refers to that species as Greenland Turbot or Newfoundland turbot.

Greenland halibut is found in the Arctic parts of the Atlantic Ocean, south to Finland and the Grand Banks.

Hawaii

FISHERIES LANDINGS, 1963:

The 1963 commercial catch of fish and shellfish in the State of Hawaii totaled 11.7 million pounds valued at $2.7 million ex-vessel. Compared with the previous year, that was a decline of 1.4 million pounds (11 percent) and $140,700 (5 percent)--due largely to reduced skipjack tuna landings.

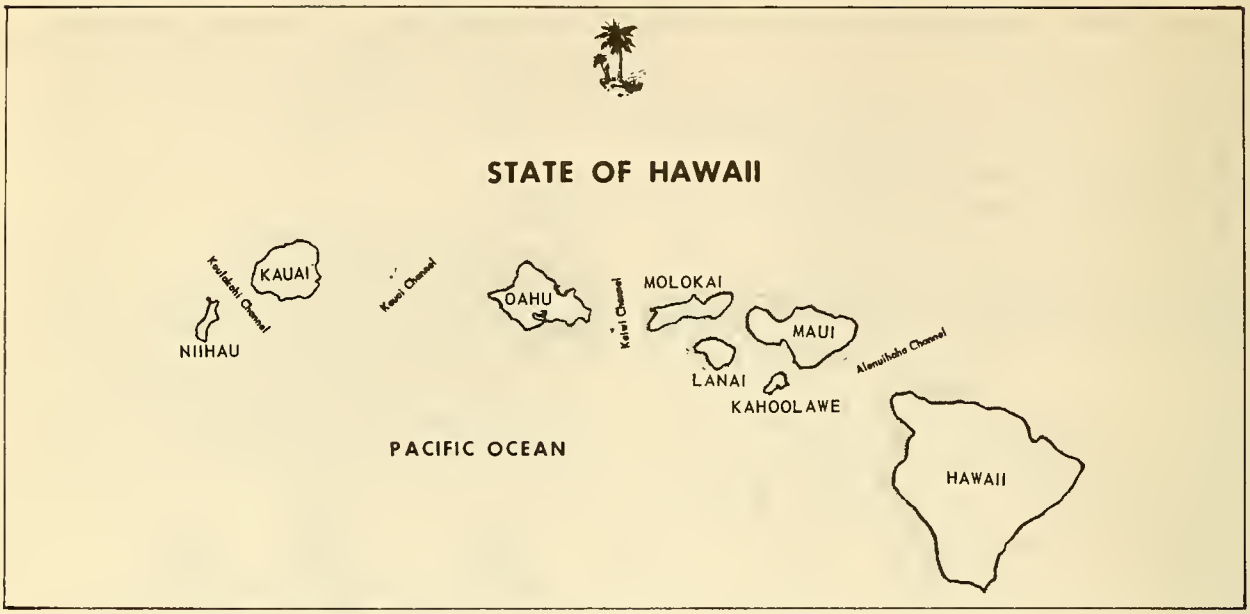


Hawaii tuna catch, 1955-63.

The Hawaiian skipjack catch in 1963 totaled 8.1 million pounds valued at $1.1 million as compared with the 1962 skipjack catch of 9.4 million pounds valued at $1.2 million. The Hawaiian big-eyed tuna catch was also down in 1963--948,000 pounds with a value of $502,000 as compared with the 1962 big-eyed tuna catch of 1.2 million pounds with a value of $598,000.

The 1963 Hawaiian landings included 385,000 pounds of yellowfin tuna, 401,000 pounds of jack mackerel, 334,000 pounds of striped marlin, 190,000 pounds of black marlin, and 151,000 pounds of big-eyed scad.

Oahu led the Hawaiian Islands in landings during 1963 with 8.7 million pounds or nearly 75 percent of the total. The Island of Hawaii was next with 1.6 million pounds, followed by Maui with 1.2 million pounds. The remainder of the catch was landed at ports in the Islands of Molakai, Kauai, and Lanai.



The 1963 Hawaiian catch was taken by 820 fishermen. Fishing craft operated during the year included 56 vessels (craft of 5 net tons and over), 360 motor boats, and 23 other boats.

Industrial Fishery Products

GROWTH-PROMOTING ABILITY OF FISH SOLUBLES IN CHICK FEED CONFIRMED:

The growth rate of chicks was significantly increased by the addition of condensed fish solubles to basal rations at levels of 3 and 5 percent, according to a summary by British workers of results of their experiments during a period of several years. Rate of growth was increased significantly when solubles were added to an all-vegetable protein ration that met all known requirements except that for the UGF (unidentified growth factor) of fish. Growth likewise was increased significantly when solubles were added to a "more usual chick-rearing mash" containing fish meal at a level of 10 percent. The growth-promoting activity was found to be nearly equally divided between fractions that were soluble in water and other fractions that were not; the latter were separated from diluted fish solubles with a centrifuge. Increase over growth rate on a ration containing only vegetable protein was 6.6 percent and it was even larger when the basal ration contained fish meal at a level of 10 percent.

The fish solubles used were (commercial) good quality condensed herring solubles and, in the trials, the added solubles were substituted for an equal amount of the whole basal ration. The experiments were reported in an issue of The British Journal of Nutrition (vol. 18, no. 3, p. 461, 1964). (Technical Advisory Unit, U.S. Bureau of Commercial Fisheries, Boston, Mass., November 4, 1964.)

* * * * *

UNITED STATES MARINE-ANIMAL OIL TRENDS 1964 AND OUTLOOK FOR 1965:

Summary: The total United States supply of marine-animal oils during calendar year 1965 probably will be smaller than the estimated 420 million pounds for 1964, unless domestic production shows a considerable increase. Beginning stocks on January 1, 1965, were expected to be down from the 168 million pounds of January 1964. With imports forecast at about the same level as in 1964, total available supply will be tied largely to the 1965 industrial catch of the domestic fishery, which will not get into full swing until April or May 1965. Over 90 percent of total domestic marine-animal oils are obtained from the menhaden catch landed along the east and Gulf coasts of the United States.

Production: United States marine-animal oil production in 1964 was estimated at 180 million pounds as compared with 186 million pounds in 1963. Production during January-September 1964 totaled 153 million pounds compared with 154 million pounds for the same period in 1963. Production of marine-animal oils in recent years has declined, due to a drop in the menhaden catch.

Imports: United States marine-animal oil imports in 1965 probably will be near the 1964 estimated total of 75 million pounds, due to a relatively tight world supply. Imports during 1963 totaled 83 million pounds. Whale sperm oil, a special oil valued as a lubricant for fine instruments, accounts for about 80 percent of total marine-animal oil imports, with fish-body oils and fish-liver oils each accounting for around 10 percent.

Exports: United States exports of marine-animal oils (mostly menhaden oil) in 1965 will depend primarily upon domestic production. Should the 1965 menhaden fish catch improve, considerably larger exports are foreseen than the 175 million pounds now estimated for 1964. Exports in 1963 totaled 274 million pounds. If offered at competitive prices, a good market exists for menhaden oil overseas, where it is used largely as an edible oil in the manufacture of margarine, shortening, and other products.

Domestic Consumption: Unless supplies loosen up, factory consumption of marine-animal oils in the United States during 1965 will be down from the 1964 estimated total of 82 million pounds. Total estimated use in 1964 is down 8 percent from 1963 and reflects the increasingly tight supply situation and correspondingly higher prices. United States stocks of marine-animal oil on October 1, 1964, amounted to 147 million pounds, as compared to 182 million pounds on October 1, 1963. Factory use of marine oils during January-September 1964 was down in paint and varnish manufacture, fatty acids, animal feeds, and in lubricant production. Utilization was up, however, for resins and plastics, and other drying-oil uses.

Prices: United States fish oil prices (menhaden oil, crude, in tanks f.o.b. Baltimore) are expected to remain at their currently high levels until (next) spring, when 1965 production prospects become clearer. A steady upward trend has carried menhaden oil prices from 4.0 cents per pound in early 1963 to 9.5 cents in November 1964, the highest since January 1957. Prices for 1964 were expected to average around 8.5 cents per pound. (Fats and Oils Situation, November 1964.)

* * * * *

U.S. FISH MEAL, OIL, AND SOLUBLES:

Production by Areas, October 1964: Preliminary data on U.S. production of fish meal, oil, and solubles for October 1964 as collected by the U.S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in the table.

U.S. Production1/ of Fish Meal, Oil, and Solubles by Areas, October 1964 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized3/
	Short Tons	1,000 Pounds	. . . . (Short Tons)	
October 1964:				
East & Gulf Coasts	6,683	4,406	3,145	-
West Coast2/	1,746	678	1,857	-
Total	8,429	5,084	5,002	-
Jan.-Oct. 1964 Total	193,028	157,901	77,666	-
Jan.-Oct. 1963 Total	209,670	167,964	83,902	7,224

1/Does not include crab meal, shrimp meal, and liver oils.
2/Includes American Samoa and Puerto Rico.
3/Includes condensed fish.

* * * * *

Production, September 1964: During September 1964, a total of 18.5 million pounds of marine animal oils and 21,671 tons of fish meal was produced in the United States. Compared with September 1963 this was a decrease of 2.6 million pounds of marine animal oils and 2,835 tons of fish meal and scrap. Fish solubles production amounted to 8,227 tons--a decrease of 3,236 tons as compared with September 1963.

Menhaden oil production amounted to 16.8 million pounds--a decrease of 2.2 million pounds. Menhaden fish meal and scrap production in September 1964 amounted to 16,233 tons--a decrease of 3,175 tons as compared with the same month of 1963.

U. S. Production of Fish Meal, Oil, and Solubles, September 1964 1/ with Comparisons

Product	Sept. 1/1964	Sept. 1963	Jan.-Sept. 1/1964	Jan.-Sept. 1963	Total 1963
	. . . . (Short Tons). . . .				
Fish Meal and Scrap:					
Herring	1,238	1,318	9,325	6,630	7,537
Menhaden 2/	16,233	19,408	137,205	154,527	181,750
Tuna and mackerel	2,463	2,089	19,891	16,058	26,957
Unclassified	1,737	1,691	18,178	19,904	22,415
Total	21,671	24,506	184,599	197,119	238,659
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	14,793
Grand total meal and scrap	3/	3/	3/	3/	253,452
Fish solubles:					
Menhaden	6,388	8,982	58,142	64,497	74,831
Other	1,839	2,481	14,522	19,898	25,347
Total	8,227	11,463	72,664	84,395	100,178
Homogenized condensed fish.	-	90	-	7,224	7,224
	. . . (1,000 Pounds) . . .				
Oil, body:					
Herring	218	243	9,737	4,873	5,709
Menhaden 2/	16,818	19,028	133,624	139,900	167,635
Tuna and mackerel	768	1,077	4,061	3,822	5,735
Other (including whale)	742	828	5,395	5,770	6,748
Total oil	18,546	21,176	152,817	154,365	185,827

1/Preliminary data.
2/Includes a small quantity of thread herring.
3/Not available on a monthly basis.

* * * * *

Major Indicators for U. S. Supply, September 1964: United States production of fish meal in September 1964 was lower by 11.6 percent as compared with September 1963. Production of fish oil was down by 12.4 percent and production of fish solubles decreased 28.8 percent.

Major Indicators for U.S. Supply of Fish Meal, Solubles, and Oil, September 1964

Item and Period	1/1964	1963	1962	1961	1960
	. . . . (Short Tons)				
Fish Meal:					
Production:					
September	21,671	24,506	31,712	28,800	38,527
January-Sept. 2/	184,599	197,119	249,590	252,274	226,268
Year 3/	-	253,452	312,259	311,265	290,137
Imports:					
September	34,082	35,320	13,698	13,941	9,487
January-Sept.	355,917	304,464	208,694	159,140	97,333
Year	-	383,107	252,307	217,845	131,561
Fish Solubles:					
Production: 4/					
September	8,227	11,553	12,988	11,232	12,523
January-Sept. 2/	72,664	91,619	103,513	93,706	85,316
Year	-	107,402	124,649	112,254	98,929

(Table continued on next page)

Major Indicators for U.S. Supply of Fish Meal, Solubles, and Oil, September 1964 (Contd.)

Item and Period	1/1964	1963	1962	1961	1960
	(Short Tons)				
Imports:					
September	214	225	178	263	38
January-Sept.	3,896	2,994	5,196	2,508	2,832
Year	-	6,773	6,308	6,739	3,174
	(1,000 Lbs.)				
Fish Oils:					
Production:					
September	18,546	21,176	31,197	25,174	32,685
January-Sept. 2/	152,817	154,365	207,915	221,109	166,863
Year	-	185,827	250,075	258,118	290,143
Exports:					
September	14,190	22,408	219	9,521	13,959
January-Sept.	120,442	187,012	96,624	95,375	108,778
Year	-	262,342	123,050	122,486	143,659

1/Preliminary.
2/Data for 1964 based on reports which accounted for the following percentage of production in 1963: Fish meal, 95 percent; solubles and homogenized fish, 99 percent; and fish oils, 99 percent.
3/Small amounts (10,000 to 25,000 pounds) of shellfish and marine animal meal and scrap not reported monthly are included in annual totals.
4/Includes homogenized fish prior to 1964--none produced in 1964.

* * * * *

U.S. FISH MEAL AND SOLUBLES:

Production and Imports, January-September 1964: Based on domestic production and imports, the United States available supply of fish meal for January-September 1964 amounted to 540,516 short tons--38,933 tons (or 7.8 percent) more than during January-September 1963. Domestic production was 12,520 tons (or 6.4 percent) less, but imports were 51,453 tons (or 16.9 percent) higher than in January-September 1963. Peru continued to lead other countries with shipments of 285,770 tons.

U. S. Supply of Fish Meal and Solubles, January-September 1964 with Comparisons

Item	Jan.-Sept. 1/1964	Jan.-Sept. 1963	Total 1963
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	137,205	154,527	181,750
Tuna and mackerel	19,891	16,058	26,957
Herring	9,325	6,630	7,537
Other	18,178	19,904	37,208
Total production	184,599	197,119	253,452
Imports:			
Canada	42,819	39,535	50,925
Peru	285,770	231,864	291,544
Chile	11,302	22,637	24,249
Norway	-	1,819	1,819
So. Africa Republic	13,087	7,241	12,296
Other countries	2,939	1,368	2,274
Total imports	355,917	304,464	383,107
Available fish meal supply	540,516	501,583	636,559
Fish Solubles:			
Domestic production 2/	72,664	3/91,619	3/107,402
Imports:			
Canada	1,226	1,624	2,034
Iceland	-	-	160
So. Africa Republic	935	191	411
Other countries	1,735	1,179	4,168
Total imports	3,896	2,994	6,773
Available fish solubles supply	76,560	94,613	114,175

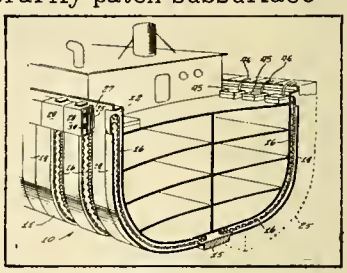
1/Preliminary.
2/50-percent solids.
3/Includes production of homogenized fish.

The United States supply of fish solubles during January-September 1964 amounted to 76,560 tons--a decrease of 19.1 percent as compared with the same period in 1963. Domestic production dropped 20.7 percent but imports of fish solubles increased 30.1 percent.

Inventions

NEW SYSTEM TO HELP KEEP DAMAGED VESSELS AFLOAT:

A new safety system for vessels has been patented. To temporarily patch subsurface damage to vessel hulls, the system provides slidable doors which can be moved over the damaged area (Patent No. 3,118,414). To give flotation and buoyancy to damaged vessels, the system provides below waterline flotation chambers which can be positioned by a chain device; additional flotation is provided by air-inflated blankets under each deck (Patent No. 3,122,119). Claims of nonsinkable vessel operation are made for the system when all its features are used. The patents for the system were granted to Robert D. Smith, 2742 E. Tremont Ave., Bronx 61, New York, N.Y. (Products List Circular, Small Business Administration, November 1964.)



Investment Opportunity

TUNA FISHERIES IN RYUKYU ISLANDS:

United States technical and capital participation is being sought by five tuna fishing companies in the Ryukyu Islands. Such a venture would offer a United States investor the advantage of operating in a dollar area under a stable government. United States authorities in the Ryukyus are encouraging the expansion of the tuna industry of the Islands.

Offshore tuna fishing appears to offer the greatest potential for the Ryukyu tuna industry. Tuna canning is another possibility. (As of November 1964, there were no fish canneries in the Ryukyus.)

In September 1964, the Ryukyu tuna fleet had a combined gross tonnage of about 5,500 tons. The Ryukyu Government is interested in licensing new tuna vessels to raise the tonnage of the tuna fleet to 12,000 gross tons by 1969.

In fiscal year 1964, the Ryukyu tuna catch totaled 17,537 metric tons, consisting of 4,970 tons from coastal fishing, 6,904 tons from inshore operations, and 5,663 tons from offshore fishing. In fiscal year 1964, the Ryukyu Islands imported marine products (chiefly from Japan) valued at about $4 million and exported marine products valued at about $2 million.

Labeling

PENNSYLVANIA ISSUES NEW RULING ON REQUIREMENTS:

A new administrative ruling (Regulation 2504) concerning the prominence, placement, and quantity statements on package labels has been issued by the Pennsylvania Bureau of Standard Weights and Measures. The ruling becomes effective on labels redesigned after January 1, 1965; and to labels prepared from plates made after January 1, 1965; and to all labels after January 1966.

Marketing

EDIBLE FISHERY PRODUCTS, 1964:

The United States catch of food fish in 1964 was expected to decline again. Catches of nearly all of the major species were down--salmon and haddock were notable exceptions. United States fishermen as of October 1964 had landed much less Maine herring, ocean perch, shrimp, halibut, cod, and whiting than in 1963. United States imports of fishery products continued to increase in 1964 and more than offset the lower domestic catch. Imports of Japanese tuna and Canadian frozen groundfish blocks increased sharply during the remainder of the year.

Although supplies of many fishery items were expected to be adequate during the remainder of 1964, some were to become relatively scarce. A few items--salmon and haddock products in particular--were plentiful. Supplies of shrimp, halibut, scallops, and cod were expected to tighten.

View of wholesaler's stand on South Street in the salt-water section of Fulton Fish Market.

The total consumption of fishery products in 1964 increased at about the same rate as population, so little change occurred in the per capita consumption which at 10.7 pounds was up only slightly from the previous year.

Note: This analysis was prepared by the Bureau of Commercial Fisheries, U.S. Department of the Interior, and published in the U.S. Department of Agriculture's November 1964 issue of the National Food Situation (NFS-110).

Middle Atlantic States

FISHERIES LANDINGS, 1963:

The 1963 commercial landings of fish and shellfish in the Middle Atlantic States (New York, New Jersey, and Delaware) totaled 487.9 million pounds with a value of $20.9 million ex-vessel (excluding unclassified trash fish). That was a drop of 46 percent in quantity and 16 percent in value from the previous year due mainly to lower landings of menhaden.

Menhaden 1963 landings in the Middle Atlantic States totaled only 372.9 million pounds with an ex-vessel value of $4.3 million, compared with 1962 landings of 782.5 million pounds with an ex-vessel value of $7.9 million.

Substantial declines also occurred during 1963 in Middle Atlantic landings of blue crabs, oysters, and scallops; there were moderate

declines for scup, fluke, whiting, bluefish, butterfish, and cod.

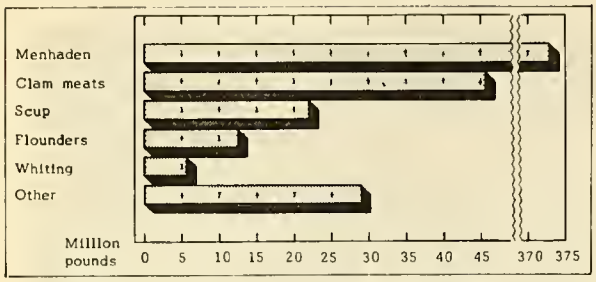


Fig. 1 - Middle Atlantic States catch, 1963.

To offset the decline were increases for tuna landings which rose from 38 tons in 1962 to 2,858 tons, mainly bluefin, in 1963. Landings were also up for surf clams and hard clams, striped bass, sea bass, blackback flounder, and yellowtail flounder.

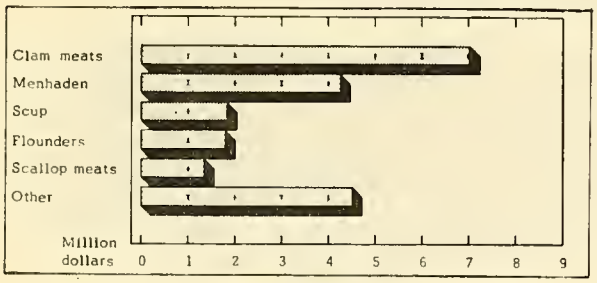
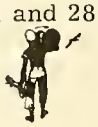


Fig. 2 - Value of Middle Atlantic States catch, 1963.

Of the total 1963 Middle Atlantic landings, New Jersey received 52 percent, New York 27 percent, and Delaware 21 percent. The percentage breakdown by value was New Jersey 50 percent, New York 44 percent, and Delaware 6 percent. The Middle Atlantic catch in 1963 was taken by 8,553 fishermen operating 599 vessels (craft of 5 net tons and over), 4,085 motor boats, and 288 other boats.



New England

FISHERIES LANDINGS, 1963:

The commercial fisheries of the New England States (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut) in 1963 yielded 829 million pounds of fish and shellfish valued at $68.3 million ex-vessel. That was a decline from the previous year of 43 million pounds (5 percent), but an increase of $2.5 million (4 percent).

The 1963 New England catch of groundfish (cod, cusk, haddock, ocean perch, pollock, and white hake) totaled 294.7 million pounds, down 10 percent from 1962. Also well below 1962 landings were menhaden, whiting, and sea scallops. Yellowtail flounder showed the largest increase--up 38 percent for a record New England catch of 78 million pounds in 1963.

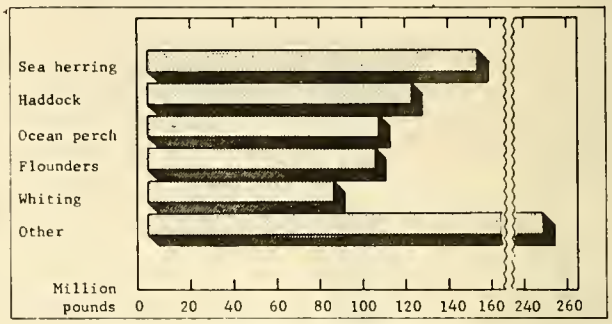


Fig. 1 - New England States catch, 1963.

Average ex-vessel prices for the majority of New England food fish items were higher in 1963 than a year earlier. Shellfish prices were much improved, reflecting to some degree consumer preference for more costly food.

The 1963 landings in each of the New England States, with the exception of New Hampshire, were down from 1962. Massachusetts led in catch with 56 percent of the 1963 New England landings, followed by Maine with 34 percent; Rhode Island 8 percent; and Connecticut and New Hampshire 1 percent each. The catch breakdown by value in 1963 was Massachusetts 60 percent, Maine 31 percent, Rhode Island 6 percent, Connecticut 2 percent, and New Hampshire 1 percent.

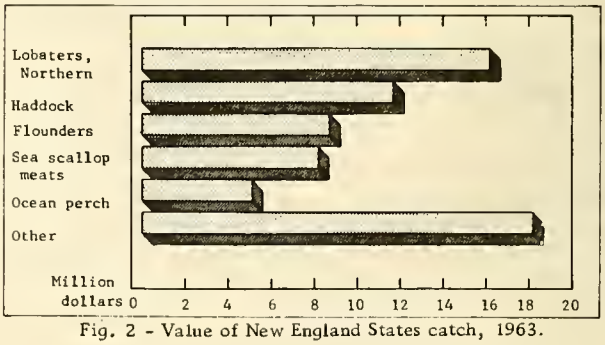


Fig. 2 - Value of New England States catch, 1963.

In 1963, a total of 21,428 fishermen using 733 vessels of 5 net tons or greater and 10,746 other craft operated in the fisheries of the New England area. Compared with the

previous year, that was a gain of 6 vessels, but a decrease of 108 fishermen and 367 other craft.

Manufactured fishery products produced in the New England States in 1963 were valued at $121.3 million at the processors' level. That was a decline of $11.7 million from 1962.

North Atlantic Fisheries Investigations

SEA HERRING SURVEY CONDUCTED:

M/V "Delaware" Cruise 64-7 (September 8-12, 1964): The objectives of this cruise were to: (1) sample populations of adult sea herring and to obtain related environmental data, (2) obtain sea herring blood samples, (3) make plankton tests for early fall-spawned herring larvae, and (4) obtain blood samples and measurements from offshore lobsters. The area of operations for these investigations by the U. S. Bureau of Commercial Fisheries research Biological Laboratory, Boothbay Harbor, Me., using the Bureau's exploratory fishing vessel Delaware, was on the Northern Edge of Georges Bank to Cultivator Shoals along the 40-fathom contour line.

During the cruise, 6 otter-trawl sets and 2 gill-net sets were made at stations worked. The trawl sets (45 minutes each) made in waters from 40 to 55 fathoms yielded herring catches ranging from one-quarter to 83 bushels, the average catch per tow being 24 bushels (about 1,800 pounds). The 2 gill-net sets (600 feet of net) for adult herring and sardines yielded a total of three dozen adults. The herring measured from 19.3 to 35.0 centimeters (7.5 to 13.8 inches) long. Preliminary examination indicated that the 1960 year-class contributed about 60 percent of the total samples obtained. During the cruise, 294 herring were sampled for blood which was frozen in liquid nitrogen. No lobsters were obtained.

A total of 19 one-meter net plankton tows of 15-minutes duration (5 minutes at 10 meters or 32.8 feet, 5 minutes at 5 meters or 16.4 feet, and 5 minutes at the surface) were made during the cruise. A total of 41 yolk sac larvae with a mean length of 5.5 millimeters or 0.22 inches (range 4-7 millimeters or 0.12-0.28 inches) were obtained on the northern edge of the Banks.

At trawl sets, gill-net sets, and plankton sets, 5 drift bottles and 5 sea-bed drifters were released. Bathythermograph casts were made, surface salinity samples collected, and weather observations recorded. At the different stations worked the salinity ranged from 32.3 to 33.5 and surface temperatures ranged from 56.1 to 65.0.

Note: See Commercial Fisheries Review, September 1963 p. 35.

North Pacific Fisheries Explorations and Gear Development

NEWLY-DESIGNED PELAGIC TRAWL TESTED:

M/V "St. Michael" Cruise 4 (October 1-15, 1964): To test the effectiveness of, and determine the catch rate of a lampara trawl was the principal objective of this cruise off the Washington coast near Umatilla by the U.S. Bureau of Commercial Fisheries chartered exploratory fishing vessel St. Michael.

The lampara trawl, developed by the Bureau's exploratory fishing base at Seattle, was built to determine if a trawl with a relatively great horizontal spread and a small vertical opening rigged to fish just off-bottom with conventional otter boards could efficiently catch hake without need of depth-telemetry gear. The spread across the wing tips of the net is about 100 feet, while the height of the body at the forward end is 18 feet. The trawl was designed to fish between 2 and 4 fathoms off the bottom with otter boards in contact with the sea bed.

The secondary objective of the cruise was to determine if the "Cobb" pelagic trawl could be rigged to effectively fish both on the bottom and in midwater by rigging the hydrofoil otter boards near the lower wings of the net. During past cruises, hydrofoil trawl boards were placed 60 fathoms ahead of the trawl with bridles running from each hydrofoil back to the upper and lower wing tips. During this cruise the hydrofoils were rigged as shown in illustration.

The lampara trawl caught less hake per hour than the "Cobb" pelagic trawl. The lampara trawl caught an average of 1,600 pounds of fish an hour, mostly hake, in a total of 17 drags compared to an average of 3,400 pounds

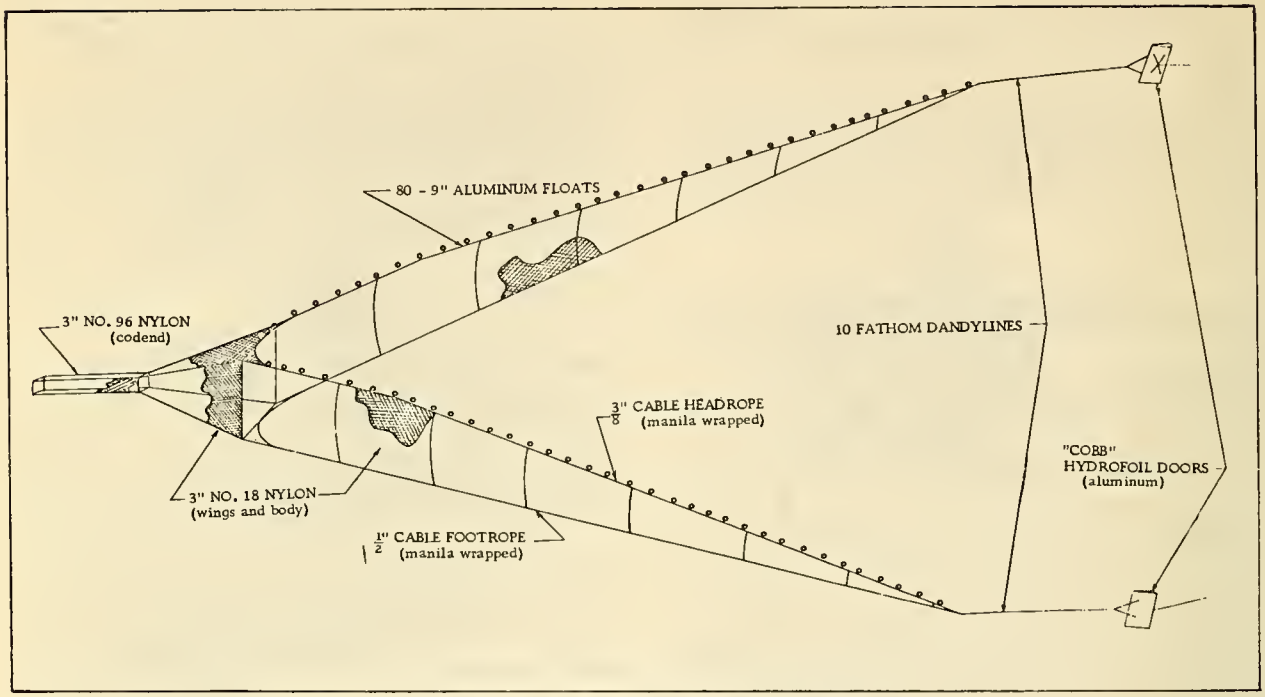


Fig. 1 - Shows lampara trawl tested on St. Michael cruise 4.

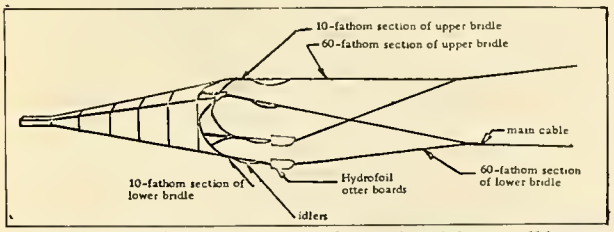


Fig. 2 - Shows "Cobb" pelagic trawl rigged to fish just off-bottom on St. Michael cruise 4.

of fish an hour for the "Cobb" pelagic trawl in a total of 8 drags.

The echo-sounder showed that most fish were not located from 2 to 4 fathoms above the bottom as expected. Most fish were between 4 and 25 fathoms above the bottom. When the lampara trawl was towed with the otter boards on the bottom, the net probably went below most of the fish. When the trawl was tested in midwater, the depth of the net could not be accurately determined and probably wasn't correct to intercept fish during most of the drags. More fish would have been caught with both trawls if an accurate system to determine trawl depth had been used.

During the cruise the lampara trawl was first tested with hydrofoil otter boards. After catching 10,000 pounds of fish in one 60-minute tow, conventional otter-trawl boards were substituted for the hydrofoils. An average of 3,000 pounds of fish per half-hour tow was taken in 3 drags made with the lampara net and conventional otter boards. Examination of the otter-board runners showed that they were not in as firm contact with the bottom as desired. In attempts to improve performance of the otter boards, 16 experimental drags were made in shallow water. After each drag various adjustments were made. In addition to testing light versus heavy otter boards, effects of varying the number of floats on the headrope, varying the amount of trawl cable used, and varying the altitude of the otter boards were examined. But after 16 drags, the otter boards still were not in proper contact with the bottom. Therefore, all further tests of the lampara net were made with hydrofoil boards.

In an attempt to determine trawl depth, a wireless depth telemeter was used. Although the wireless depth telemeter gave accurate readings in calm water at reduced throttle speeds, no useful depth readings were obtained under normal fishing conditions.

An additional 8 drags were made with the lampara net and hydrofoil otter boards. Those

drags caught few fish, the best drag yielding only 1,300 pounds in a 1-hour tow.

The last eight drags were made with the "Cobb" pelagic trawl and the hydrofoil boards. Those drags were more productive, catching an average of 3,400 pounds of fish in each 1-hour tow.

Almost all hake were found in surface to bottom depths of 25 to 65 fathoms. They occurred from the bottom to 40 fathoms above the bottom, with largest concentrations between 4 and 25 fathoms above the bottom. The average length of hake caught during the cruise was about 58 centimeters (22.8 inches). Herring and euphausids were commonly found in the stomachs.

Note: See Commercial Fisheries Review, December 1964 p. 54.

Oceanography

CONFERENCE HELD ON DYNAMICS OF AIR-SEA CURRENTS:

A Conference on the Dynamics of the Air-Sea Interface, sponsored by the National Science Foundation, was held November 22-25, 1964, at the Institute of Marine Science, University of Miami, Miami, Fla. The conference was attended by leading oceanographers from all over the United States.

A thorough knowledge of the sea's surface, as a meeting place of air and water currents, is considered important in the designing of sailboats and hydrofoil craft. The conference discussed the operation and behavior of such craft under varying sea conditions, as well as the new "air-bubble" type of craft, which ride just above the water on a cushion of air.

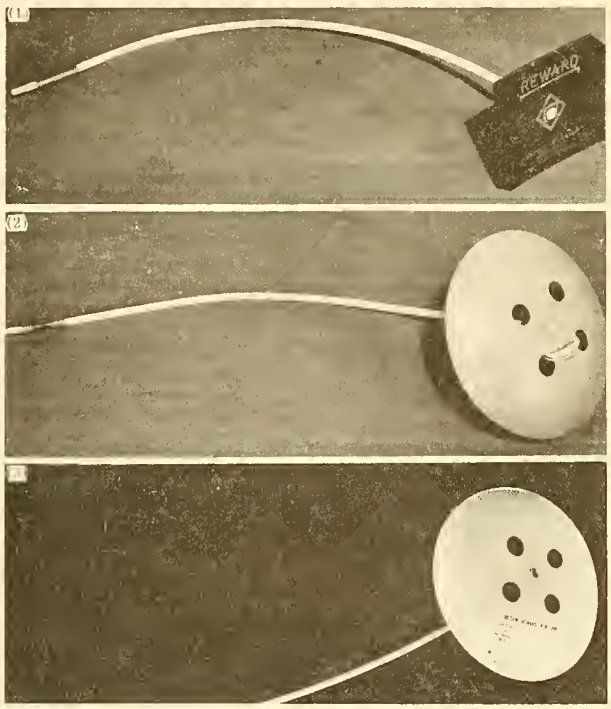
Other sessions were in connection with the effects of ocean waves on anchored buoys. In scientific studies of underwater sound--currently one of the most vital research programs now under way at the Miami Institute of Marine Science and at other oceanographic institutions--a virtually immovable but floating platform is often required to house delicate instruments for precise measurements. Giant manned buoys that move no more than a few inches in 20-foot waves have been designed.

The effect of waves, currents, and winds upon all anchored vessels is considered great. Recently a special ship was designed to act as a drifting platform for the MOHOLE (sea-floor drilling) project, which proposes to lower drilling equipment to the bottom of the sea and drill a hole 3 miles deep into the sea-floor. That important project, and the special devices and techniques needed to complete it successfully, also was discussed at the conference. (Press release, Institute of Marine Science, University of Miami, Miami, Fla., November 11, 1964.)

* * * * *

"SEA-BED DRIFTERS" AID IN STUDYING WATER CURRENTS:

In recent years oceanographers have been making increasing use of drifting plastic objects known as "sea-bed drifters," in order to obtain information about the movements of the water near the seabed. The drifters are released in batches at certain points in the sea and trail over the seabed, later to be recaptured in the nets of fishermen, or by skin divers, or to be washed ashore and found by the public. Rewards are offered for their recovery and return with details of the position and date of finding. The study of that information enables the oceanographer to construct a picture of the currents near the seabed.



(1) The Craig sea-bed drifter. (2) The Woodhead sea-bed drifter as used by British scientists. (3) The Woodhead sea-bed drifter as used by United States scientists.

Glass bottom-trailing drift bottles with metal wire "tails" were used in European waters at various times from 1904 to 1939 and in United States waters in 1960 and 1961. The plastic sea-bed drifter was first conceived by R. E. Craig of the Marine Laboratory, Aberdeen, Scotland. The present version of it consists of a black plastic square measuring 11.3 x 11.3 centimeters (about 4 x 4 inches), with a reward ntoice in English inlaid in red. The time and place of release are indicated by a series of punch marks around the edge of the square. Through the middle of the square is fitted a white plastic rod, or "tail" (about 54 centimeters or 21 inches long and 0.65 centimeters

in diameter). This has a small copper weight attached near its lower end, so that the drifter has a slight negative buoyancy and moves over the seabed with its tail just touching the bottom.

The drifter most commonly in use at present was developed by P. M. J. Woodhead of the Fisheries Laboratory, Lowestoft, England. It resembles a toadstool and has a white polythene rod identical with that now used in the Craig drifter, but instead of a black plate it has a red polyethylene saucer of 18.5 centimeters (7.3 inches) diameter. The rod is sharpened to a point at its lower end with a 6-centimeter (2.4-inch) copper ferrule above it; the red saucer has four 2-centimeter (0.8-inch) holes at a distance of 8 centimeters (3.2 inches) from its center. The version used by the Lowestoft Laboratory bears instructions to the finder on the saucer in English, French, and German, and provision has been made so that additional languages can be used if required. A serially numbered yellow polyvinyl chloride tag is secured to the saucer and this bears a reward notice in the English language only.

In Canada and the United States the Woodhead version of the sea-bed drifter is used. The United States sea-bed drifters have a red stem and a yellow saucer, with the serially numbered return labels and instructions in English stuck to the saucer. The Canadian sea-bed drifters have a red saucer and a white rod, with a serially numbered yellow "spaghetti" tag, similar to a fish tag, secured to the saucer for identification and return instruction purposes. The only printing on the spaghetti tag is: "Reward, Ret. Fish. Res. Board St. Andrews, N.B. S-05391."

The Craig type of drifter has been extensively used off the east and west coasts of Scotland, and English workers have made a number of large-scale releases of the Woodhead type in the North Sea and Irish Sea. The rate of recovery of the latter type in the North Sea has been up to 50 percent in 12 months. Releases of Woodhead drifters have also been made off the northwest coast of Norway and in the southeastern Barents Sea. Belgian scientists have now started to use this type of drifter in the southern North Sea. In North American waters the Woodhead type has been released by United States scientists over all parts of the Continental Shelf from the Nova Scotia Banks to Florida. Starting in 1961, sea-bed drifters have been released by Canadian workers on the shelf along the Canadian Atlantic coast from the Bay of Fundy to the Gulf of St. Lawrence. Recently emphasis has been given to simultaneous releases of the sea-bed drifters and drift bottles. The rate of recovery by trawlers from releases made on the Nova Scotian Shelf is of the order of 5 to 6 percent. In 1963, a total of 2,700 sea-bed drifters was released there.

The success of investigations with sea-bed drifters depends very largely on the fishermen and the public who find them. The greater the number of drifters which are returned with accurate details of the positions and dates of their recapture, then the greater is the information available to the oceanographer and the more reliable are his deductions about currents. The active cooperation of fishermen is earnestly requested by all those marine scientists who make use of this particular instrument. (Presented as Document No. 35 to the 14th Annual Meeting of the International Commission for the Northwest Atlantic Fisheries, Hamburg, June 1964.)

* * * * *

DEEP-DIVING SUBMARINE TESTED IN TRIAL DIVES:

The Alvin, a 22-foot oceanographic research submarine designed for ocean deep-diving, was commissioned June 5, 1964, by the Woods Hole Oceanographic Institution, Woods Hole, Mass. After being commissioned, the submarine underwent a long series of tests in local waters around Woods Hole. Tests consisted of short, shallow dives lasting from 1 to 2 hours each in 70 feet of water or less. The purpose of the dives was to teach the pilots how to operate the craft, and to indoctrinate the Institution's scientists in its capabilities when it becomes fully operational.

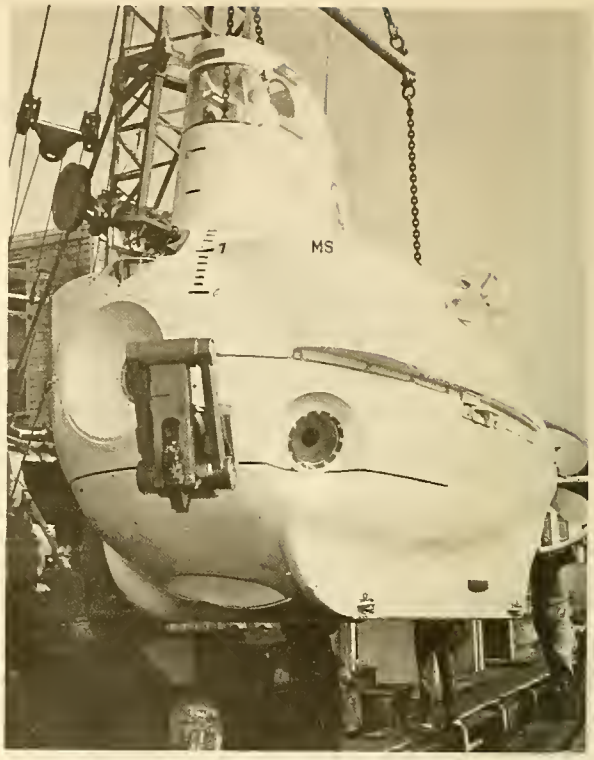


Fig. 1 - Preparing to lower Alvin into the water.

The Alvin underwent a careful part-by-part inspection in the fall of 1964 in order to uncover any existing weak points in her systems and to find out if there were any areas of critical corrosion or undue wear. Final installation was scheduled of instruments such as lights, cameras, depth recorders, etc.

Fig. 2 - Shows Alvin being lowered into the water but not yet waterborne.

Fig. 3 - Shows Alvin under way on the water's surface.

When completely ready, the Alvin was scheduled to head south for deep-diving in warmer and clearer water. It was expected this would probably be during early 1965 in the Bahamas where she would undergo diving tests down to 6,000 feet. After all tests have proved successful the Alvin will be turned over to the Institution for use on its research programs.

Note: See Commercial Fisheries Review, August 1964 p. 36; April 1964 p. 25.

* * * * *

GULF OF GUINEA SURVEYED BY RESEARCH VESSEL "GERONIMO":

Data collected during a 4-month voyage in the South Atlantic by the oceanographic research vessel Geronimo was to be analyzed by scientists of the U.S. Bureau of Commercial Fisheries and the University of Columbia, announced the Department of the Interior, November 17, 1964. The vessel is operated by the Bureau's Biological Laboratory, Washington, D.C. The primary objective of the survey was to obtain new information which would benefit the fisheries of Senegal, Nigeria, Sierra Leone, and the Ivory Coast, countries which cooperated in the study. According to the Bureau's laboratory director, the information obtained is expected to add materially to knowledge of the fishery potential in the Gulf of Guinea, and the permanence of a new ocean undercurrent which was discovered on a previous cruise by the Geronimo.

Presence of the newly discovered undercurrent was first indicated in the summer of 1962. Equipment lowered from the vessel into the easterly flowing Guinea current was suddenly pulled to the west. A current meter used during the Geronimo's latest voyage indicated the continued presence of the undercurrent, but since both observations were made in similar weather, the scientists now want to study it during another season to determine its permanence. This will be done during the Geronimo's next trip to the Gulf of Guinea scheduled for January 1965.

Six scientists of the U.S. Bureau of Commercial Fisheries, who made the entire voyage, were joined for portions of the survey by 3 University of Columbia scientists, as well as other Bureau personnel. The University oceanographers were to analyze the data concerning the Guinea undercurrent. A representative of the U.S. National Museum was also aboard the vessel for a portion of the trip to observe bird life.

Note: See Commercial Fisheries Review, November 1964 p. 57; July 1964 p. 24; April 1964 p. 47.

Oregon

SILVER SALMON TRANSPLANTS MAY HELP BUILD RUNS IN WILLAMETTE RIVER SYSTEM:

Successful spawning by transplanted adult silver salmon in the Willamette River system was revealed by stream surveys in late 1964 by Oregon Fish Commission biologists. The surveys were a followup on 6,800 surplus silver salmon distributed from the Oregon Cascade Hatchery into 13 tributaries of the Willamette River. The transplanting program is an experiment since the new waters were not the natal streams of the fish. The surveys confirmed the hopes of biologists that the female fish, gravid with eggs, would spawn in the new environment. Some attempts in the past to transplant adults that were less "ripe" have resulted in the fish moving back downstream, apparently in search of their home waters.

The strong tendency of adult salmon to return to their stream of origin can work against

the expansion of spawning populations. Suitable tributaries with few or no salmon have little chance to develop large runs. Transplanting surplus adult salmon seems to offer a good opportunity to establish production in such areas.

Optimism for the survival and return of the offspring of the salmon transplanted in Willamette River waters is especially high because of the pending construction of the new $2 million fishway at Willamette Falls, long a barrier to the upstream migration of the species. The fishway's 1966 completion date should accommodate 1964-spawned salmon when they return in 1967 as spawning adult salmon.

Well over 900 redds or spawning nests were observed in the 39 miles of stream covered in the sample appraisal. That was only a small portion of the potential incubation area available in the streams where the fish were released. Spawning silvers were observed as far as 19 miles upstream from the original point of release, and redds were also found in over a dozen smaller tributaries of the streams in which the plants were first made. Further investigations will be conducted in the spring and summer of 1965 to determine the relative success of egg incubation and juvenile rearing.

The transplants of silver salmon in the Willamette River tributaries were only a part of the massive movement of over 25,000 excess adult silver salmon available in 1964 at Oregon Fish Commission hatcheries. The ripe fish, both male and female, were transported to various Oregon release sites stretching from the northeast corner of the State to south coast streams. The effort to develop new silver runs in Oregon has involved some 16 major river systems. In late 1964, the transplanting program was still under way at Oregon Fish Commission coastal hatcheries where late-arriving silver salmon were swamping hatchery facilities. (Oregon Fish Commission, November 19, 1964.)

Note: See Commercial Fisheries Review, Dec. 1964 p. 56.

Oysters

MARYLAND OBSERVATIONS FOR 1964:

Spatfall in 1964: Spatfall in the summer of 1964, as measured by the use of the transite plates, appears to have been a success in most Maryland areas, although it was not up to the exceptional levels of last year. This method of monitoring the setting pattern only indicates the period when the larval oysters in any given area are attaching themselves to the cultch, and not the number able to survive.

A survey that was to be commenced late in the fall of 1964 under the auspices of the Department of Chesapeake Bay Affairs with the cooperation of the Chesapeake Biological Laboratory was expected to produce some evidence of the number of surviving spat in representative areas.

A valid picture of the setting pattern in Maryland's oyster-producing areas can be obtained only if the monitoring program is begun early enough in the spring and ended late enough in the fall to measure all of the waves of setting.

The last station to receive any set was the County Seed Area in Piney Island Swash, at which a single spat was collected during the week of September 17-23. Setting in the other areas had ended by that time. In the seed areas, such as the upper St. Marys River, parts of Eastern Bay, and Broad Creek, strong waves of setting were recorded, and much good seed was probably produced. Just how well the young oysters fared can only be ascertained by a systematic sampling of bottom material, carried out after the spat have grown large enough to be easily seen.

The setting pattern in the Tred Avon River, Irish Creek, Broad Creek, and Harris Creek was monitored by personnel from the U. S. Bureau of Commercial Fisheries Laboratory at Oxford, Md.

Notes: (1) For more detailed data write to Chesapeake Biological Laboratory, Natural Resources Institute, University of Maryland, Solomons, Md. ("Final Report of Maryland Oyster Observations for 1964," Bulletin No. 2, Oct. 20, 1964.)
(2) See Commercial Fisheries Review, Oct. 1964 p. 34.

Pacific Marine Fisheries Commission

ANNUAL MEETING HELD:

The annual meeting of the Pacific Marine Fisheries Commission was held November 18-20, 1964, in San Francisco, Calif. The

meeting was open to the public, and this year was headed by the Director of the California Department of Fish and Game, who presided as chairman.

The Commission is composed of members from the States of Washington, Oregon, Idaho, and California. It is dedicated to the coordination of research among member states to prevent duplication, the adoption of common managerial principles and practices, and the protection of ocean and anadromous resources. The four member States draft and recommend legislation to their respective states, consult with and advise their appropriate state administrative agencies on problems connected with fisheries, and recommend the adoption of regulations they deem advisable.

Included on the agenda of this year's meeting were status reports on five important ocean fisheries--crab, shrimp, groundfish, albacore, and salmon; presentation of technical papers; and resolutions recommending ways to solve mutual problems.

Salmon

PACIFIC NORTHWEST CANNED STOCKS, NOVEMBER 1, 1964:

Canners' stocks of Pacific Northwest canned salmon of 4,032,400 actual cases on November 1, 1964, in the United States were 270,768 cases less than stocks on hand October 1, 1964. Pink salmon made up 52.3 percent (2.1 million cases, mostly 1-lb. talls) of the total canners' stocks, followed by chums (818,000 cases, mostly 1-lb. talls), and reds (750,000 cases). The remainder of about 9 percent consisted of coho and king salmon. About 78 percent of the pink salmon stocks on hand was 48 1-lb. cans, and the balance mostly 48 $\frac{1}{2}$-lb. cans.

Table 1 - Total Canners' Stocks of Pacific Northwest Canned Salmon, November 1, 1964

Species	Nov. 1, 1964	Oct. 1, 1964
	(No. of Actual Cases)	
King	104,399	134,337
Red	750,438	856,770
Coho	250,162	230,519
Pink	2,109,841	2,218,068
Chum	817,515	863,474
U. S. Total	4,032,400	4,303,168

From October 1 to November 1, 1964, pink salmon stocks were lower by 108,227 cases, reds were down 106,287 cases, and chums were down 45,959 cases.

Carryover stocks at the canners' level amounted to 1,175,588 standard cases on July 1, 1964, which is the approximate opening date of the Pacific Northwest salmon packing season. Adding the new season pack of 3,922,356 standard cases brought the total available supply this season to 5,097,944 standard cases.

Shipments at the canners' level July 1, 1964, to November 1, 1964, totaled 2,326,476 actual cases.

Information on canned salmon stocks is based on reports from canners who packed over 97 percent of the 1964 salmon pack. (Division of Statistics and Economics, National Canners Association, November 28, 1964.)

Table 2 - Total Canners' Stocks on hand November 1, 1964 (Sold and Unsold), by Species & Can Size

Case & Can Size	King	Red	Coho	Pink	Chum	Total
	(Actual Cases)					
48/$\frac{1}{4}$-lb.	14,192	146,307	70,869	7,469	1,072	239,909
48/$\frac{1}{2}$-lb.	77,980	340,344	46,816	385,562	109,808	960,510
48/1-lb.	11,915	260,969	117,812	1,648,134	676,690	2,715,520
12/4-lb.	312	2,863	14,665	68,676	29,945	116,461
Total	104,399	750,483	250,162	2,109,841	817,515	4,032,400

Table 3 - Canners' Shipments July 1, 1964-November 1, 1964, by Species & Can Size

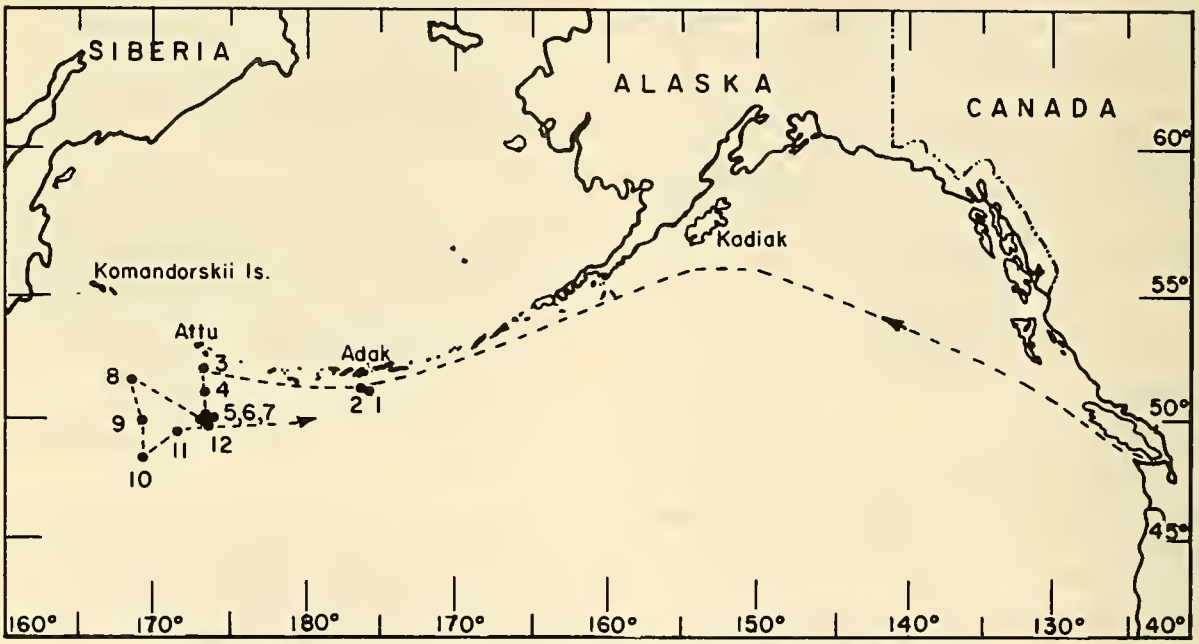
Case & Can Size	King	Red	Coho	Pink	Chum	Total
	(Actual Cases)					
48/$\frac{1}{4}$-lb.	10,055	281,625	51,823	4,212	372	348,087
48/$\frac{1}{2}$-lb.	58,862	346,750	7,559	217,906	48,283	679,360
48/1-lb.	10,206	237,085	50,697	749,790	201,917	1,249,695
12/4-lb.	104	2,087	6,825	30,721	9,597	49,334
Total	79,227	867,547	116,904	1,002,629	260,169	2,326,476

* * * * *

SALMON RESEARCH CRUISE IN THE WESTERN NORTH PACIFIC:

A salmon research cruise in the western North Pacific Ocean by the U. S. Bureau of Commercial Fisheries research vessel George B. Kelez ended on October 22, 1964, after a 2-month (6,500-mile) trip. The vessel fished stations south of the Aleutian Islands from Adak to the Komandorskii Islands.

Catch results showed that immature sockeye and chum salmon generally were more abundant in the western North Pacific, south of Attu and Komandorskii Island, than in the Adak area.



Cruise track and fishing stations of R/V George B. Kelez, August 20-October 22, 1964.

In a comparative gear study, crew members set and hauled about 1½ miles each of gill nets and long lines in simultaneous fishing experiments. Biological data of the salmon catches will be compared to determine the selective features of the two forms of gear.

To study the question of gill-net dropouts, Bureau personnel devised a sampling method in which units of gear were set, hauled, and reset at intervals throughout the night. Preliminary results indicate that on the high seas during autumn the greatest number of salmon taken in gill nets are caught between 8 p.m. and 11 p.m., with the least number between the hours of 11 p.m. to 2 a.m. About equal numbers of salmon were taken between 2 a.m. to 5 a.m. and 5 a.m. to 8 a.m. Other preliminary results indicated that the catch in gill nets fished continuously throughout the night was less than the cumulative catch in gill nets fished for short intervals during the night. The results indicate that dropouts may occur from gill nets and that Bureau scientists may have a way of measuring this possible source of mortality.

In addition to obtaining data at sea on salmon lengths, catch by mesh size, and scale samples for age determination of fish, whole frozen fish were brought back to the laboratory for detailed study of the specimens. Studies will be made to determine the country and river of origin of those salmon from the western Pacific.

--By Robert R. French,
Fishery Biologist (Research),
Biological Laboratory,
U. S. Bureau of Commercial Fisheries,
Seattle, Wash.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 725

Shrimp

BREADED PRODUCTION, JULY-SEPTEMBER 1964:

United States production of breaded shrimp amounted to 21.6 million pounds during the third quarter of 1964, according to preliminary data.

The Gulf States ranked first in the production of breaded shrimp with 12.7 million pounds. Breaded shrimp production during January-September 1964 amounted to 60.8 million pounds.

Table 1 - U. S. Production of Breaded Shrimp by Months, July-September 1964

Month	Total
	1,000 Lbs.
July	8,053
August	6,626
September	6,913
Total 3rd Qtr. 1964 1/	21,592
Total 3rd Qtr. 1963	2/
Total 1st 9 mos. 1964	60,800
Total 1st 9 mos. 1963	2/
Total 1963	75,039

1/Preliminary.
2/Not available

Table 2 - U. S. Production of Breaded Shrimp by Areas, July-September 1964

Area	Plants	July	August	September	Total
	No.	. . . . . (1,000 Lbs.)			
Atlantic States	14	2,281	2,281	2,296	6,858
Gulf States	21	5,032	3,728	3,930	12,690
Pacific States	8	740	617	687	2,044
Total	43	8,053	6,626	6,913	21,592

Table 3 - U. S. Production of Breaded Shrimp by Months, 1964 and 1963

Month	1/1964	1963
	. . . . (1,000 Lbs.). . . .	
January	6,936	2/
February	7,498	2/
March	6,706	2/
April	6,353	2/
May	5,558	2/
June	6,157	2/
July	8,053	2/
August	6,626	2/
September	6,913	2/
October	-	7,390
November	-	6,129
December	-	5,513
Total.		75,039

1/Preliminary.
2/Not available

South Atlantic Fisheries Explorations and Gear Development

LONG-LINING FOR SWORDFISH IN SOUTH ATLANTIC TESTED:

M/V "Oregon" Cruise 93 (July 15-August 7, 1964): To assess the availability of swordfish (Xiphias gladius) to long-line gear in the Gulf Stream System off the coasts of North Carolina and South Carolina was the objective of this 24-day cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon.

Thirteen long-line sets (12 night and 1 day) consisting of a total of 6,300 hooks were conducted in the area covered. A unit of gear was composed of 138 fathoms of mainline, 3 fathoms of branchline and 1 fathom of leader. Buoy drops varied from 1 to 30 fathoms. Baits used were frozen herring (Clupea), cigarfish (Decapterus), and menhaden (Brevoortia). Herring had the highest percentage of loss per hook (49.5 percent) as compared to the cigarfish (18 percent) and menhaden (12 percent).

Only 3 swordfish were taken during the cruise--1 each off Cape Hatteras (1,000 fathoms), Cape Lookout (100 fathoms), and Cape Romain (500 fathoms). The fish from off Cape Hatteras measured 200 centimeters (about 79 inches) and weighed 68 pounds. The swordfish from the other two stations were badly mutilated by sharks, but their live weights were estimated to be from about 110 to 125 pounds each.

Swordfish (Xiphias gladius).

One set along the 500-fathom isobath off Cape Lookout, N. C., yielded 4 big-eyed tuna (Thunnus obesus). Their weights ranged from 170 to about 280 pounds. Other bony fish species taken on long-line gear included: yellowfin tuna (Thunnus albacares), skipjack (Katsuwonus pelamis), blue marlin (Makaira nigricans), white marlin (Tetrapterus albidus), dolphin (Coryphaena hippurus), lancetfish (Alepisaurus sp.), the gempylid (Lepidocybium flavobrunneum), and wahoo (Acanthocybium solanderi).

Long-line sets near the edge of the Continental Shelf along the 100-fathom isobath resulted in heavy catches of sharks. The

silky shark (Carcharhinus falciformis) was the dominant species in that area; 94 captures were made at 4 stations. Other species of sharks caught at the same stations included hammerhead (Sphryna diplana), dusky (Carcharhinus obscurus), mako (Isurus oxyrhinchus), and thresher (Alopias superciliosus).

In addition to long-lining activities, trolling lines were fished while steaming between stations. Fish caught on this gear were 9 dolphin, 3 king mackerel (Scomberomorus cavalla), 2 skipjack tuna, and 1 false albacore (Euthynnus alleteratus). No surface fish schools were seen during the entire cruise.

After setting the long-line gear at night, dip-net stations were made using a 500-watt incandescent light suspended over the water surface. Six surface nekton ring-net stations were occupied during setting and hauling of the long-line gear. One larval swordfish was taken with that gear at the 1,000-fathom curve off Cape Romain at night where the surface water temperature was 83° F. All specimens taken at the light-attraction and nekton ring net stations were preserved by U. S. Bureau of Commercial Fisheries biologists for future identification and study.

Species Identification

NEW METHOD RECOMMENDED FOR ADOPTION:

A quick, positive method to identify the species source of the meat in processed fishery products has for some years been under development by the U. S. Food and Drug Administration (FDA). Using electrophoretic principles--a technique in which water-soluble proteins separate qualitatively into band patterns which can be made clearly visible by staining and, like fingerprints, are distinctive for each species of fish--the FDA has developed a "starch-gel" method of fish species identification which has been published as a first action in the Methods of Analysis of the Association of Official Agricultural Chemists. If, after analysis by three collaborating laboratories, the method is accepted by that Association as an official final action, it will be the first official chemical technique for making species identification in processed fishery products. The U. S. Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Mass., was one of the three collaborating laboratories in this important study, and their analysis has been sent to FDA for evaluation.

A referee committee of the Association reviewed the final results of the collaborative study and recommended that the "starch gel" electrophoretic method be officially adopted. The results of the study were to be published in the Journal of the Association of Official Agricultural Chemists.

Sport Fish

NEW RESEARCH VESSEL "DOLPHIN" TO STUDY COASTAL GAME FISH RESOURCES:

The U. S. Bureau of Sport Fisheries and Wildlife new research vessel, the Dolphin, a converted Army tug, and first of the Bureau's research vessels to be assigned to coastal exploration of game fish resources, was commissioned at the Sandy Hook Marine Laboratory, Highlands N. J., on October 14, 1964.

Bureau of Sport Fisheries and Wildlife research vessel Dolphin.

The 400-ton, steel-hulled Dolphin is 107 feet long and is powered by a 1,200-horsepower Diesel engine. It cruises at 11 knots and can accomodate a party of 16. Equipped with research and navigational aids--radar, two bathythermograph electric winches, trawling winches, radio-navigation system, fish-finder, and portable fish tanks--the vessel is a floating laboratory. It will further game fish research by enabling fishery biologists and oceanographers to conduct exploratory fishing studies, collect marine specimens, and carry on other field research.

The Dolphin was constructed in 1953 in West Wago, La.

U. S. Fishing Vessels

NEW SWORDFISH LONG-LINING VESSELS:

In November 1964, a Rhode Island shipyard delivered the new swordfish long-lining vessel Chilmark Voyager to her Massachusetts owners. The new 83-foot vessel, together with her sistership, the Chilmark Sword (delivered in September 1964), began working out of New Bedford, Mass.

Fig. 1 - New swordfish long-lining vessel Chilmark Sword.

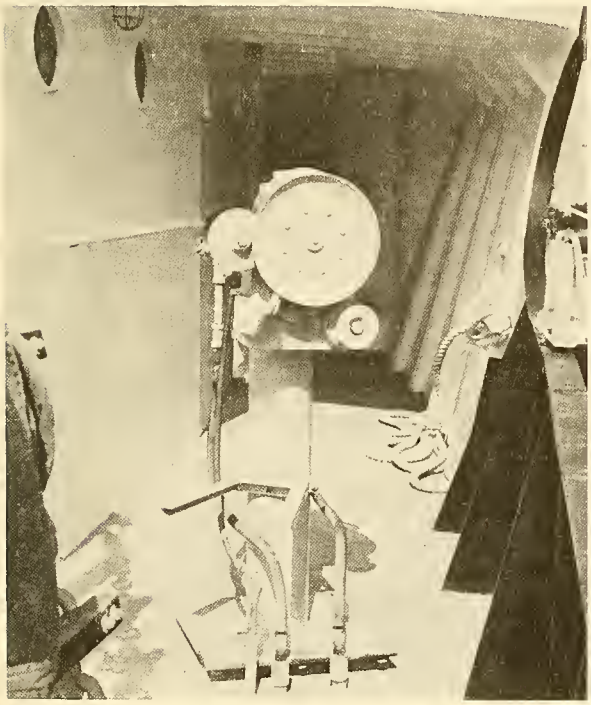


Fig. 2 - Hydraulic line-hauler used aboard Chilmark Sword and Chilmark Voyager.

On her first long-lining trip, the Chilmark Sword returned to New Bedford with 283 swordfish. The quality of the fish was enhanced by the 4-inch plastic insulation in the vessel's plywood-fiberglass hold (3,200-cubic-foot capacity). It was difficult to tell the first of the catch from the last fish taken aboard, according to the skipper of the vessel.

The Chilmark Sword and the Chilmark Voyager are designed for swordfish long-lining on a year-round basis. But they can be quickly converted to stern-trawling. Each vessel is powered by a 460-horsepower Diesel engine driving a 60-inch 4-blade propeller. The vessels carry radar, radiotelephone, and echo-sounding equipment.

Note: See Commercial Fisheries Review, Dec. 1964 p. 64.

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DOCUMENTATIONS ISSUED AND CANCELLED:

September 1964: During September 1964, a total of 34 vessels of 5 net tons and over were issued first documents as fishing craft, as compared with 45 in September 1963. There were 39 documents cancelled for fishing vessels in September 1964, as compared with 22 in September 1963.

Table 1 - U. S. Fishing Vessels 1/--Documentations Issued and Cancelled, by Areas, September 1964 with Comparisons

Area (Home Port)	September 1964	September 1963	Jan.-Sept. 1964	Jan.-Sept. 1963	Total 1963
			(Number)		
Issued first documents 2/:					
New England	2	1	26	18	23
Middle Atlantic	2	1	8	16	18
Chesapeake	1	8	27	45	66
South Atlantic	2	8	37	59	77
Gulf	18	24	182	194	239
Pacific	9	3	123	146	160
Great Lakes	-	-	1	4	5
Hawaii	-	-	1	-	-
Puerto Rico	-	-	1	2	2
Total	34	45	406	484	590
Removed from documentation 3/:					
New England	6	-	29	38	48
Middle Atlantic	3	1	14	42	47
Chesapeake	3	3	15	16	25
South Atlantic	8	2	27	45	53
Gulf	6	9	56	87	118
Pacific	11	3	107	68	87
Great Lakes	2	2	9	13	15
Hawaii	-	2	-	3	3
Total	39	22	257	312	396

Note: For explanation of footnotes, see table 4.

Table 2 - U.S. Fishing Vessels--Documents Issued by Vessel Length and Area, September 1964 2/

Length in feet	New England	Middle Atlantic	Chesapeake	South Atlantic	Gulf	Pacific	Total
				(Number)			
27-27.9	-	-	-	-	-	1	1
28-28.9	-	-	-	-	-	1	1
31-31.9	-	-	-	-	1	2	3
32-32.9	1	-	-	-	-	-	1
33-33.9	-	-	-	-	1	-	1
34-34.9	-	-	-	-	1	1	2
37-37.9	-	-	-	-	-	1	1

(Table continued on next page.)

Table 2 - U.S. Fishing Vessels--Documents Issued by Vessel Length and Area, September 1964 2/ (Contd.)

Length in feet	New England	Middle Atlantic	Chesa-peake	South Atlantic	Gulf	Pacific	Total
				(Number)			
38-38.9	-	-	1	-	-	-	1
40-40.9	-	1	-	-	-	1	2
42-42.9	-	-	-	-	2	-	2
45-45.9	-	-	-	-	1	-	1
47-47.9	-	-	-	-	-	1	1
49-49.9	-	-	-	-	2	-	2
54-54.9	-	-	-	1	-	-	1
59-59.9	-	-	-	-	-	1	1
60-60.9	-	-	-	-	1	-	1
63-63.9	-	-	-	-	1	-	1
64-64.9	-	1	-	-	2	-	3
65-65.9	-	-	-	1	5	-	6
66-66.9	-	-	-	-	1	-	1
70-70.9	1	-	-	-	-	-	1
Total	2	2	1	2	18	9	34

Note: For explanation of footnotes, see table 4.

Table 3 - U.S. Fishing Vessels--Documents Issued by Tonnage and Area, September 1964 2/

Gross Tonnage	New England	Middle Atlantic	Chesa-peake	South Atlantic	Gulf	Pacific	Total
				(Number)			
5-9	1	-	-	-	-	1	2
10-19	-	1	1	-	6	5	13
20-29	-	-	-	-	-	1	1
30-39	-	-	-	-	2	1	3
40-49	-	-	-	1	-	1	2
50-59	-	-	-	-	1	-	1
60-69	-	-	-	1	1	-	2
70-79	-	-	-	-	5	-	5
80-89	-	-	-	-	2	-	2
90-99	1	-	-	-	-	-	1
100-109	-	-	-	-	1	-	1
110-119	-	1	-	-	-	-	1
Total	2	2	1	2	18	9	34

Note: For explanation of footnote, see table 4.

Table 4 - U.S. Fishing Vessels--Documents Issued by Vessel Horsepower and Area, September 1964 2/

Horse-power	New England	Middle Atlantic	Chesa-peake	South Atlantic	Gulf	Pacific	Total
				(Number)			
110-119	-	-	1	-	-	1	2
120	-	-	-	-	-	1	1
130-139	1	-	-	-	2	3	6
145	-	-	-	-	-	1	1
150	-	-	-	-	-	1	1
160-169	-	-	-	-	3	1	4
170-179	-	-	-	-	2	-	2
200	-	-	-	-	1	-	1
220-229	-	-	-	1	5	1	7
250	-	-	-	-	1	-	1
300	-	-	-	-	1	-	1
320	-	-	-	-	1	-	1
330-339	-	-	-	1	2	-	3
380	1	-	-	-	-	-	1
450	-	1	-	-	-	-	1
525	-	1	-	-	-	-	1
Total	2	2	1	2	18	9	34

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/There was 1 redocumented vessel in September 1964 previously removed from the records. Vessels issued first documents as fishing craft were built: 26 in 1964; 2 in 1957; 1 in 1956; 3 prior to 1944; and 2 unknown.
3/Includes vessels reported lost, abandoned, forfeited, sold, alien, etc.
Source: Monthly Supplement to Merchant Vessels of the United States, Bureau of Customs, U.S. Treasury Department.

U. S. Foreign Trade

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

United States imports of tuna canned in brine during January 1-October 31, 1964, amounted to 37,162,653 pounds (about 1,769,650 standard cases), according to preliminary data compiled by the U. S. Bureau of Customs. This was substantially less (14.5 percent) than the 43,462,313 pounds (about 2,069,634 standard cases) imported during January 1-November 2, 1963.

The quantity of tuna canned in brine which can be imported into the United States during the calendar year 1964 at the 12½-percent rate of duty is limited to 60,911,870 pounds (or about 2,900,565 standard cases of 48 7-oz. cans). Any imports in excess of that quota will be dutiable at 25 percent ad valorem.

* * * * *

PROCESSED EDIBLE FISHERY PRODUCTS, SEPTEMBER 1964:

United States imports of processed edible fishery products in September 1964 were down 6 percent in quantity from those in the previous month, although the value of the imports was about the same in both months. The decline in quantity was due mainly to a drop in imports of frozen groundfish blocks and slabs from Canada, Iceland, and Greenland.

Compared with the same month in 1963, imports in September 1964 were up 7 percent in quantity and 13 percent in value. In September 1964 there were larger imports of canned sardines, canned crab meat, sea catfish fillets, flounder fillets, and halibut fillets. But imports were down for canned oysters, canned albacore tuna, and haddock fillets.

In January-September 1964, imports were up 1 percent in quantity and 5 percent in value from those in January-September 1963. During January-September 1964, there were larger imports of groundfish blocks (increase mainly from Canada and Iceland), flounder fillets, yellow pike fil-

U.S. Imports and Exports of Processed Edible Fishery Products, September 1964 with Comparisons

Item	Quantity				Value			
	Sept.		Jan.-Sept.		Sept.		Jan.-Sept.	
	1964	1963	1964	1963	1964	1963	1964	1963
	(Millions of Lbs.)				(Millions of $)			
Fish & Shellfish:								
Imports 1/	48.7	45.7	392.7	388.6	15.2	13.4	118.4	113.0
Exports 2/	5.6	2.9	33.7	22.9	3.9	2.1	17.2	10.6

1/Includes only those fishery products classified by the U.S. Bureau of Census as "Manufactured foodstuffs." Included are canned, smoked, and salted fishery products. The only fresh and frozen fishery products included are those involving substantial processing, i.e., fish blocks and slabs, fish fillets, and crab meat. Does not include fresh and frozen shrimp, lobsters, scallops, oysters, and whole fish (or fish processed only by removal of heads, viscera, or fins, but not otherwise processed).
2/Excludes fresh and frozen.

lets, sea catfish fillets, halibut fillets, and canned sardines not in oil. But there was a decline in imports of canned tuna, canned crab meat, canned oysters, canned salmon, swordfish fillets, and haddock fillets.

Exports of processed edible fish and shellfish from the United States in September 1964 were up 24.4 percent in quantity and 34.5 percent in value from those in the previous month. Heavy September shipments of canned salmon--totaling almost 3.0 million pounds and going mainly to the United Kingdom--accounted for most of the increase. There was some decline in exports of canned shrimp and canned squid.

Compared with the same month of 1963, the exports in September 1964 were up 93.1 percent in quantity and 85.7 percent in value. Again, the increase was due mainly to larger shipments of canned salmon. Exports were also up for canned squid (principally to Greece and the Philippines), canned sardines not in oil, and canned shrimp. But exports were down for canned mackerel.

Processed fish and shellfish exports in the first 9 months of 1964 were up 47.2 percent in quantity and 62.3 percent in value from those in the same period of 1963. In January-September 1964 there were much larger shipments of canned mackerel and canned salmon. Exports of canned shrimp and canned sardines in oil were also higher, but exports of canned sardines not in oil and canned squid were down.

Notes: (1) Prior to October 1963, the data shown above were included in news articles on "U.S. Imports and Exports of Edible Fishery Products." Before October 1963, data showing "U.S. Imports of Edible Fishery Products" summarized both manufactured and crude products. At present, a monthly summary of U.S. imports of crude or non-processed fishery products is not available; therefore, only import data are, therefore, not comparable to previous reports of "U.S. Imports of Edible Fishery Products."
The export data shown are comparable to previous data in "U.S. Exports of Edible Fishery Products." The export data in this series have always been limited to manufactured or processed products.
(2) See Commercial Fisheries Review, December 1964 p. 66.

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NEW UNITED STATES EXPORT CLASSIFICATION SCHEDULE:

A new classification for United States export commodities was placed in effect January 1, 1965, by the U. S. Bureau of the Census. The new classification is designated as Schedule B, 1965 Edition. The old Schedule B, in effect since 1958, became obsolete on December 31, 1964.

Schedule B, 1965 Edition, contains some 3,600 classifications for export commodities, compared with 2,600 classifications under the old Schedule B. It shows 7-digit rather than 5-digit code numbers. The new export classification must be used for all shipments made after December 31, 1964, and the new 7-digit numbers must be reported for all such shipments.

* * * * *

AIRBORNE IMPORTS OF FISHERY PRODUCTS, JANUARY-JULY 1964:

Airborne fishery imports into the United States in July 1964 were up 40.2 percent in quantity and 29.7 percent in value from those in the previous month. The increase was due to heavier imports of shrimp from Venezuela.

Total airborne shrimp imports in July 1964 consisted of 1,049,117 pounds of fresh and frozen raw headless and 12,140 pounds of unclassified shrimp. About 99 percent of the airborne shrimp arrivals in July 1964 entered through the Customs District of Florida. The remainder entered through the Customs Districts of New Orleans (La.), Galveston (Tex.), New York (N. Y.), and Puerto Rico. Live northern lobsters from Canada were the main shellfish item other than shrimp imported by air in July 1964.

Fish fillets from Mexico accounted for the bulk of the airborne finfish imports in July 1964.

Total airborne fishery imports in January-July 1964 were down 20.2 percent in quantity and 23.0 percent in value from those in the same period of 1963. The decline was due to smaller shipments of shrimp and spiny lobsters from Central and South American countries.

U.S. 1/Airborne Imports of Fishery Products, January-July 1964 with Comparative Data

Product and Origin 2/	1964 July Qty. 3/	1964 July Value 4/	1964 Jan.-July Qty. 3/	1964 Jan.-July Value 4/	1963 Jan.-July Qty. 3/	1963 Jan.-July Value 4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:						
Mexico	40.6	5.1	269.1	58.3	177.8	53.9
British Honduras	-	-	1.8	0.4	33.9	8.6
Honduras	-	-	-	-	16.5	4.3
Japan	-	-	-	-	2.0	8.2
United Kingdom	-	-	1.9	3.6	1.6	4.2
Iran	-	-	-	-	1.2	7.4
France	-	-	4.3	7.8	0.7	0.6
Rumania	-	-	0.9	9.0	-	-
Venezuela	-	-	4.6	1.7	-	-
U. S. S. R.	-	-	-	-	26.8	70.2
Denmark	0.4	1.1	1.0	2.3/	-	-
Canada	-	-	14.8	4.8	-	-
Spain	0.7	0.6	3.9	3.3	-	-
Other countries	-	-	3.8	2.7	0.8	0.3
Total fish	41.7	6.8	306.1	93.9	261.3	157.7
Shrimp:						
Guatemala	-	-	-	-	141.6	74.0
El Salvador	-	-	159.1	96.8	209.1	143.4
Honduras	10.3	3.8	10.3	3.8	22.7	11.9
Nicaragua	6.3	3.6	78.2	44.8	380.2	122.5
Costa Rica	14.8	6.5	203.1	114.6	375.0	179.2
Panama	56.9	41.4	569.0	350.8	1,054.6	561.8
Venezuela	961.9	447.2	3,124.0	1,431.3	3,028.4	1,455.0
Ecuador	-	-	-	-	111.6	39.4
France	-	-	-	-	2.6	0.9
British Guiana	-	-	10.5	5.2	-	-
Mexico	-	-	-	-	13.2	6.9
Other countries	11.1	4.0	12.0	5.1	-	-
Total shrimp	1,061.3	506.5	4,166.2	2,052.4	5,339.0	2,595.0
Shellfish other than shrimp:						
Mexico	-	-	9.0	4.8	79.6	45.3
British Honduras	8.2	2.2	91.0	52.6	113.5	83.5
El Salvador	-	-	-	-	5.0	3.6
Honduras	6.5	1.3	19.4	10.7	1.9	1.0
Nicaragua	-	-	50.5	40.0	101.0	62.3
Costa Rica	-	-	9.3	9.5	73.8	60.1
Jamaica	-	-	43.6	36.2	51.0	40.1
Netherlands Antilles	-	-	-	-	32.8	20.9
Colombia	-	-	-	-	8.0	21.7
Ecuador	-	-	-	-	2.2	1.8
Tunisia	-	-	-	-	0.8	0.9
British Guiana	-	-	14.5	3.2	1.7	0.3
Canada	105.1	60.4	312.9	173.4	213.3	109.2
Venezuela	-	-	-	-	13.7	6.0
Dominican Republic	1.3	0.6	9.1	2.1	22.0	20.7
Bahamas	-	-	10.6	6.8	-	-
Haiti	1.4	0.7	7.0	3.8	-	-
Other countries	0.1	0.1	0.6	0.7	4.8	4.1
Total	122.6	65.3	577.5	343.8	725.1	481.5
Grand total	1,225.6	578.6	5,049.8	2,490.1	6,325.4	3,234.2

1/Imports into Puerto Rico from foreign countries are considered to be United States imports and are included. But United States trade with Puerto Rico and with United States possessions and trade between United States possessions are not included.
2/When the country of origin is not known, the country of shipment is shown.
3/Gross weight of shipments, including weight of containers, wrappings, crates, and moisture content.
4/F.o.b. point of shipment. Does not include U. S. import duties, air freight, or insurance.
Note: These data are included in the overall import figures for total imports, i.e., these imports are not to be added to other import data published.
Source: United States Airborne General Imports of Merchandise, FT 380, July 1964, U. S. Bureau of the Census.

The data as issued do not show the state of all products--fresh, frozen, or canned--but it is believed that the bulk of the airborne imports consists of fresh and frozen products.

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TRENDS IN UNITED STATES EXPORTS OF FISHERY PRODUCTS BY COUNTRY, 1963:

In 1963, the value of United States exports of fishery products gained sharply as compared with 1962. The value of fishery products exported during 1963 was $56.6 million, an increase of 58 percent. The 1963 value established a record for exports of fishery products. The major products contributing to the increase were fish oils, frozen shrimp, and frozen salmon.

Table 1 - Value of United States Exports of Fishery Products, 1954-1963

Year	Edible	Inedible	Total
	(US$1,000)		
1963	30,379	26,227	56,606
1962	22,470	13,258	35,728
1961	19,594	15,116	34,710
1960	25,622	18,543	44,165
1959	26,747	17,495	44,242
1958	19,440	11,564	31,004
1957	20,549	15,403	35,952
1956	22,939	16,564	39,503
1955	24,923	15,054	39,977
1954	16,238	15,289	31,527

Trend by Countries: During 1963, U. S. fishery products were exported to 108 countries. Of total exports, 75 percent was shipped to six countries: United Kingdom, Canada, Japan, Sweden, West Germany, and Netherlands (table 2). Shipments to all of those countries increased substantially.

Table 2 - United States Exports of Fishery Products by Selected Countries of Destination, 1959-1963

Country	1963	1962	1961	1960	1959
	(US$1,000)				
United Kingdom	13,081	8,249	4,554	8,460	8,928
Canada	11,156	8,846	10,265	10,309	8,644
Japan	7,819	939	2,984	3,295	928
Sweden	4,473	1,076	1,665	2,613	3,176
West Germany	3,638	1,467	1,555	2,201	2,888
Netherlands	2,593	2,273	2,385	4,350	4,352
Switzerland	2,229	1,712	738	1,082	762
France	1,889	1,073	1,007	1,048	766
Italy	1,643	869	423	643	303
Norway	1,539	403	2,390	1,390	1,296
Greece	566	487	364	313	306
Belgium	445	547	351	537	746
Philippines	403	320	582	2,494	5,587
Hong Kong	388	383	368	269	229
Mexico	263	375	459	616	663
Australia	203	198	458	444	157
Venezuela	183	274	360	461	614
Ecuador	1	171	82	293	193
Cuba	-	243	-	175	787
Other	4,094	5,823	3,720	3,172	2,917
Total	56,606	35,728	34,710	44,165	44,242

United Kingdom: In 1963, exports of fishery products to the United Kingdom increased by 58 percent. The United Kingdom displaced Canada as the leading export market for U. S. fishery products, with products valued at $13.1 million or about 23 percent of the total U. S. exports of fishery products. Fish oils and canned salmon were the principal items shipped to the United Kingdom. Exports of fish oil increased $3.6 million over 1962. The major fishery commodities exported to the United Kingdom were:

Commodity	1963	1962
	(US$)	
Fish and marine-animal oil	5,142,000	1,511,000
Salmon, canned	6,006,000	5,622,000
Salmon, fresh or frozen	777,000	138,000
Shrimp, canned	798,000	682,000
Other	358,000	296,000
Total	13,081,000	8,249,000

Canada: In 1963, Canada was in second place as an export market for U. S. fishery products. The value of these exports to Canada rose 26 percent above the previous year. The principal items exported to Canada were:

Commodity	1963	1962
	(US$)	
Shrimp, fresh or frozen	2,165,000	2,081,000
Shrimp, canned	1,592,000	1,462,000
Seal furs	1,935,000	1,024,000
Fish, fresh or frozen	1,043,000	766,000
Canned fish	1,002,000	696,000
Fish, shellfish and other marine animal products, inedible	879,000	703,000
Fish, marine animal and liver oil	543,000	559,000
Salmon, fresh or frozen	581,000	197,000
Other	1,416,000	1,358,000
Total	11,156,000	8,846,000

Other Countries: The values of the principal fishery products exported to other major markets were:

Country & Product	US$
Japan:	
frozen shrimp	5,153,000
unmanufactured shell	2,075,000
Sweden, fish oil	4,121,000
W. Germany, fish oil	2,293,000
Netherlands, fish oil	1,644,000
Switzerland, seal fur	1,989,000
France:	
frsh. or froz. salmon	803
seal fur	348
Italy, seal fur	956

Trend by Areas: During 1963, Europe imported products valued at about $32.9 million, representing 58 percent of total U.S. fishery exports (table 3). The countries of the European Free Trade Association (EFTA) imported products with a value of $21.8 million, or 38 percent of U.S. exports of fishery products. The members of the European Economic Community (EEC or Common Market) obtained fishery products valued at $10.2 million, or 18 percent of total fishery exports. North American countries took products valued at $13.2 million, or 23 percent of total U.S. fishery product exports.

Table 3 - United States Exports of Fishery Products by Area of Destination, 1963

Area	Edible	Inedible	Total
	(US$1,000)		
Europe	12,669	20,181	32,850
North America	9,547	3,695	13,242
Asia	6,836	2,174	9,010
South America	265	97	362
Africa	436	33	469
Oceania	625	48	673
Total	30,378	26,228	56,606

Trend by Commodities: In 1963, significant gains were made in exports of most of the major fishery products (table 4). Fish oils were the leading commodity entering this trade, accounting for 28 percent of total exports. Exports of fish oil increased 159 percent over 1962 owing to a substantial strengthening in the export market which had remained dull during most of 1962. Salmon products valued at about $11.3 million were next in importance followed closely by shrimp with a value of $10.8 million.

Table 4 - Value of United States Exports of Fishery Products by Selected Commodities, 1959-1963

Commodity	1963	1962	1961	1960	1959
	(US$1,000)				
Fish oils	15,636	6,047	8,908	10,688	11,902
Seal furs	5,877	3,851	3,097	3,309	2,580
Shells, unmanufactured	2,136	1,285	1,380	2,636	977
Miscellaneous fish (mostly fresh water, fresh or frozen)	1,858	1,135	809	947	622
Oysters, shucked	191	311	448	497	575
Salmon:					
Fresh	2,530	872	647	1,677	659
Cured	509	528	593	435	372
Canned	8,239	7,292	5,580	9,830	10,639
Mackerel, canned	681	671	581	211	135
Miscellaneous fish, canned	628	460	391	355	326
Sardines, canned, not in oil	666	1,285	1,336	3,443	5,843
Shrimp, fresh or frozen	7,748	3,299	3,694	2,303	1,682
Shrimp, canned	3,054	2,572	2,487	3,383	2,898
Squid, canned	742	729	353	691	906

Foreign trade plays a significant role in the economics of the U. S. fishing industry. The United States is a leading importer of fishery products, buying foreign products valued at almost $500.0 million in 1963. Exports, valued at $56.6 million, provide important markets for certain products of U. S. fisheries. Many of those products are well recognized in world trade.

Wholesale Prices

EDIBLE FISH AND SHELLFISH, NOVEMBER 1964:

Most of the fresh and frozen unprocessed finfish items were lower-priced from October to November 1964 and the overall wholesale price index for November dropped 2.4 percent from the previous month. At 108.9 percent of the 1957-59 average, the index this November was 2.6 percent higher than in the same month of 1963.

November prices for all of the major products in the drawn, dressed, or whole finfish subgroup were considerably lower than in October. A 16.3-percent drop in that index was due mainly to relatively sharp price declines for halibut, haddock, and salmon. At New York City, western halibut prices were 31.5 percent lower because of the seasonal changeover from the fresh to frozen. End-of-the-season fresh halibut supplies at New York City were very light in October and prices were high. Frozen dressed king salmon at New York City in November was lower-priced (13.8 percent lower) than the fresh which was still available the previous month. Ex-

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, November 1964 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Nov. 1964	Oct. 1964	Nov. 1964	Oct. 1964	Sept. 1964	Nov. 1963
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					108.9	111.6	109.7	106.1
Fresh & Frozen Fishery Products:					113.0	116.6	113.7	109.0
Drawn, Dressed, or Whole Finfish:					111.7	133.4	129.1	117.0
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.14	.17	107.8	135.5	110.9	124.7
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.38	.56	112.4	164.1	162.7	97.1
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.83	.96	115.6	134.1	136.2	124.0
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.50	.54	74.6	79.8	70.9	83.6
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.65	.48	106.4	77.8	90.1	75.3
Processed, Fresh (Fish & Shellfish):					111.1	106.5	107.4	107.2
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.44	.40	106.9	97.1	106.9	131.1
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.88	.83	102.5	96.7	95.5	85.0
Oysters, shucked, standards	Norfolk	gal.	7.25	7.13	122.2	120.1	122.2	130.7
Processed, Frozen (Fish & Shellfish):					110.8	104.7	100.0	98.6
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.35	.36	88.7	91.2	92.5	98.9
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.39	.38	112.9	109.9	108.5	111.4
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.30	.30	103.4	103.4	103.4	119.2
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.95	.87	112.7	103.2	95.5	89.5
Canned Fishery Products:					102.2	103.1	103.1	101.2
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	21.25	21.75	92.6	94.8	94.8	101.3
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.56	11.56	102.6	102.6	102.6	96.6
Mackerel, jack, Calif., No.1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	6.25	6.25	105.9	105.9	105.9	97.5
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.00	10.00	128.3	128.3	128.3	113.3

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

vessel prices at Boston for large haddock were down sharply (20.4 percent) from the high of the previous month. In contrast, prices skyrocketed (up 36.7 percent) for Lake Huron fresh round yellow pike because of very light supplies. As compared with November 1963, the subgroup index this November was 4.5-percent lower mostly because of lower prices for haddock and salmon.

All products listed in the subgroup for processed fresh fish and shellfish were higher-priced in November 1964 and the index was up 4.3 percent from the previous month. Prices for frozen haddock fillets rose 10.1 percent (but those prices were 18.5 percent lower than in November 1963) and South Atlantic fresh shrimp at New York City were up 6.0 percent. A somewhat stronger market for shucked standard oysters pushed November prices for that product up although those prices were 6.5 percent lower than in November 1963. As compared with the same month a year earlier, the subgroup index this November was higher by 3.6 percent largely because of substantially higher fresh shrimp prices.

A 5.8-percent increase from the previous month in the November 1964 processed frozen fish and shellfish subgroup index was due to higher frozen shrimp prices (wholesale price up 8 cents a pound) at Chicago. As compared with November a year earlier, the subgroup index this November was higher by 12.4 percent because of sharply increased prices (up 25.9 percent) for frozen shrimp. Prices this November for several species of frozen fillets in the subgroup were below those in November 1963 and tended to cancel out part of the November 1964 strong subgroup index rise caused by high shrimp prices.

Lower prices from October to November for Alaska canned pink salmon accounted for an 0.9-percent drop in the canned fishery products subgroup index. Prices for other canned fish items remained the same as in the previous month. Stocks of canned pink salmon were liberal in November and prevailing prices were lower than a year earlier by 8.6 percent. November 1964 prices for canned Maine sardines were unchanged since September. With the sardine packing season drawing to a close, the 1964 pack was slated to run far short of the previous season. The November 1964 subgroup index was 1.0 percent higher than in the same month a year earlier. Prices this November were higher for all canned fishery products except pink salmon.

SONAR TAGS USED TO STUDY FISH MIGRATIONS

Strange noises heard coming from a number of fish swimming in Lake Mendota, near Madison, Wis., were not so strange to aquatic biologists, who had equipped the fish with an ultrasonic signaling device to study their migratory habits.

Tags smaller than the tip of a pencil were inserted into the stomachs of white bass. These tags chirp ultrasonic signals (70 to 150 kilocycles), which are picked up by an underwater receiver in a boat following the fish. Researchers began experimenting with the tiny transmitter about a year ago. They have been charting the courses of the bass to discover how those fish so unerringly find their way back to home spawning grounds.

The white bass, which spawn in late May and early June, were chosen for the study because they always spawn in the same two areas of the lake near the shore. The tracking boat must stay within one-half mile of the marked fish and can receive signals for about 15 hours before the power supply is exhausted, the researchers reported. By tracking and charting the paths of the sonar-equipped fish in the lake, the researchers are trying to find environmental guides that the fish may use in their journey.

The researchers, who reported their fish-tracking work at a meeting of the National Academy of Sciences in Madison, are in the process of developing a more advanced tag to study the larger salmon. Eventually, the ultrasonic tag may be used to follow the migration patterns of other aquatic animals, such as porpoise and turtles.

The study is being supported by a National Science Foundation research grant. (Science News Letter, October 24, 1964.)